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Business Environment and Concepts

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Volume 4—BUSINESS ENVIRONMENT AND CONCEPTS**

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Welcome to the CPA Exam!

If you have taken the CPA exam before, you are now facing a new exam format, including some new material. However, you should know that overall the exam content has not changed very much, probably less than 20%. What definitely has changed is the schedule for the CPA examination, not only in May and November, but offered at various times during the four quarters of the year.

The CPA Examination

The CPA exam is a computer-based test (CBT). There are four sections: Auditing & Attestation (AUD), Financial Accounting & Reporting (FAR), Regulation (REG), and Business Environment & Concepts (BEC). Each section includes sets of multiple-choice questions (testlets). In addition, all sections, except the newest section, Business Environment and Concepts, contain a new case study component called "simulations." Simulations provide a set of facts and require candidates to complete related tasks and access authoritative literature.

Signing up and taking the exam:

Candidates have significant flexibility in where and when they take the CPA examination. The exam is administered at Prometric Test Centers. There are some 300 test centers throughout the United States; however, not all of them offer CPA exam testing. Candidates may take the exam five days a week during any testing window. Weekday hours are 9am to 6pm. Many locations have extended hours, and some test centers offer weekend testing. International candidates are required to test within the 54 jurisdictions that currently administer the CPA examination.

There are four testing windows per year: January-February, April-May, July-August and October-November. In most jurisdictions, candidates are able to take any or all sections of the exam during any testing window; however, the candidate is not allowed to take the same section more than once during any testing window.

The Application Process. Requirements to take the CPA examination vary from state to state. Therefore, candidates should contact the state board in their jurisdiction when requesting an application to sit for one or more parts of the CPA exam. After being determined by a state board to be eligible to take the exam, the candidate will receive a Notice to Schedule (NTS) and can then make an appointment with Prometric on their web site, www.prometric.com/cpa, or by phone, or in person at a test center. Candidates are encouraged to schedule at least 45 days in advance. No candidate will be scheduled fewer than five days before testing.

Call 1-800-CPA-EXAM if you are applying to:

Colorado, Connecticut, Delaware, Florida, Georgia, Hawaii, Indiana, Iowa, Kansas, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, Ohio, Pennsylvania, Puerto Rico, Rhode Island, South Carolina, Tennessee, Utah, Vermont, Virginia, or Wisconsin.

Call the Board of Accountancy if you are applying to:

Alabama, Alaska, Arizona, Arkansas, California, District of Columbia, Guam, Idaho, Illinois, Kentucky, Maryland, Mississippi, Nevada, North Carolina, North Dakota, Oklahoma, Oregon, South Dakota, Texas, U.S. Virgin Islands, West Virginia, or Wyoming.

Call Castle Worldwide at 1-800-655-4845 if applying to Washington.

Notice to Schedule (NTS). Your NTS will contain an “examination password” that you must enter on the computer as part of the log-in process. You will not be admitted to the test center without the NTS, and all exam fees will be forfeited for that section. Be sure your identification exactly matches the name on the NTS. Also, do not apply for the exam until you are ready to take it, because the NTS could expire in six months, won’t be extended and all fees lost. A six-month NTS validation period has been established in all jurisdictions except the following:

<u>TEXAS</u>	<u>CALIFORNIA</u>	<u>NORTH DAKOTA</u>	<u>SOUTH DAKOTA</u>	<u>LOUISIANA</u>
3 MONTHS	9 MONTHS	12 MONTHS	12 MONTHS	18 MONTHS

EXAMINATION SECTIONS

<u>New Section</u>	<u>Length Hours</u>	<u>Old exam counterpart</u>
Auditing and Attestation	4.5	Auditing
Regulation (1)	3.0	Law & Professional Responsibility
Financial Accounting and Reporting (2)	4.0	Same – See note below
Business Environment & Concepts (3)	2.5	Managerial and Cost Accounting
The entire CPA examination length is 14 hours.		

- (1) Includes Federal Income Tax 60%, Law and Professional Responsibility 40%
- (2) Includes Fund Accounting and Not-for-Profit Organizations 20%
- (3) Includes several new subjects, such as economic concepts and information technology, and traditional exam subjects, but in greater depth.
(See Content Specifications at the end of this section.)

Candidates take different, equivalent exams consisting of items from a pool of test questions according to defined specifications. The specifications ensure that the results are comparable. The test package delivered to the test centers contains the test items, and also the rules for administering the tests. All items are classified according to content and statistical properties before they are administered in an operational test. The testing software ensures that each candidate’s test contains appropriate content coverage and difficulty.

RECOGNITION OF PARTIAL CREDIT UNDER OLD EXAM FORMAT

For those who have conditioning credit after the last paper and pencil exam in November 2003, credit is recognized for the new exam as follows:

Credit on Paper-based Exam	Will earn CBT credit
Auditing AUD	Auditing & Attestation
Law and Professional Responsibility LPR	Business Environment & Concepts
Accounting & Reporting ARE	Regulation
Financial Accounting & Reporting FARE	Financial Accounting & Reporting

RELEASE OF GRADES

Distribution of grades is the responsibility of the state boards of accountancy. Advisory grades and diagnostic information will be provided to state boards at the end of the third month of each testing cycle or testing window. For example, grades should be available to state boards for the April-May testing period at the end of June. The passing standard for the computer-based version of the Uniform CPA Examination is set at a scaled score of 75.

Once you pass a section(s) of the examination, you will likely be allowed a maximum of 18 months to pass all remaining sections in order to retain credit on the passed section(s).

AICPA EXAM TUTORIAL

A CPA examination tutorial prepared and tested by the CBT exam Steering Group is available at www.cpa-exam.org. The tutorial covers the revised exam's look, feel, and functionality, as well as offers both guided and self-directed instructions. The tutorial does not replace practice materials according to the CBT Steering Group of the AICPA. Candidates are strongly advised to review the tutorial before taking the computer-based CPA examination.

TYPES OF QUESTIONS ON THE CPA EXAMINATION

MULTIPLE-CHOICE QUESTIONS AND SIMULATIONS

1. The majority of the computer-based CPA exam (70-80 percent) is made up of multiple-choice questions. Each section of the examination consists of "testlets" which are the multiple-choice questions (24-30 questions), and 2 "simulations." Part Four, Business Environment and Concepts (BEC), has only multiple-choice questions. BEC simulations will be added later.

The testlets will be "tracked" in that the second and third testlet will be adjusted by the computer to an easier or harder version. This will be based on the candidate's performance on the first testlet. The candidate won't know what version is on his/her computer screen. The third testlet may or may not be adjusted up or down. The system is equitable because the grading is also adjusted according to the track of the questions; if the student has a hard track, fewer questions need to be answered correctly; likewise, an easy track requires that more answers be correct.

During the exam, within each testlet, you may review and change any of your answers. Once you have exited the testlet, you will not be able to access your answers to any of the questions. The same is true for the simulations portion of the exam. Note that the

time clock on the screen is “cumulative” and indicates the time left for the entire exam, not just a portion.

II. While the majority of the test is multiple-choice questions, a key part of the exam is the “simulation” question. According to the AICPA web site, simulations “are condensed case studies that will test candidates’ knowledge and skills using real life work-related situations.” The CPA exam candidate can expect two simulations to appear in each section with the exception of Part Four-Business Environment and Concepts. The simulations will take an estimated 35-45 minutes to complete, and will require the following:

“CPA candidates are expected to know how to use common spreadsheet and word processing functions, including writing formulae for spreadsheets. They must also have the ability to use a four-function calculator or a spreadsheet to perform standard financial calculations. In addition, candidates will be asked to use online authoritative literature. Many of the question types used in the simulations are based on familiar computer interface controls (e.g., text entry, mouse clicks, highlighting, copy and pasting). In order to become familiar with the electronic tools provided for research questions, further practice may be required.”¹

Available resources during the test will depend on the simulation that the candidate receives. Incorporated into the simulation portion of the exam is an assessment of written communication skills. The exam tests typical communications an entry-level CPA would write on the job, such as memoranda, client letters, etc.

The AICPA web site displays “screen shots” utilized for the simulations. The work tabs on top of the screen direct the tasks to be performed and are highlighted by a pencil which becomes shaded once the task is complete. Simulations typically include multiple-choice questions and/or written elements such as correspondence to a client. To become familiar with navigating the computerized exam screen, it is strongly advised that the candidate visit the AICPA web site tutorial.

The CPA Exam consists of the following:

Auditing & Attestation:	3 MCQ testlets and 2 simulations
Regulation:	3 MCQ testlets and 2 simulations
Financial Accounting & Reporting:	3 MCQ testlets and 2 simulations
Business Environment & Concepts:	3 MCQ testlets

AICPA web site on simulations: Visit this site to become familiar with the computer format of simulated problems on the new CPA exam:

http://www.cpa-exam.org/lrc/exam_tutorial.html

¹ AICPA web site

Entry-level CPA skills to be measured:

Analysis: The ability to organize, process, and interpret data to develop options for decision making.

Judgment: The ability to evaluate options for decision-making and provide an appropriate conclusion.

Communication: The ability to effectively elicit and/or express information through written or oral means.

Research: The ability to locate and extract relevant information from available resource materials.

Understanding: The ability to recognize and comprehend the meaning and application of a particular matter.

Writing skills to be graded:

1. **Coherent Organization.** Candidates should organize responses so ideas are arranged logically and the flow of thought is easy to follow. Generally, short paragraphs composed of short sentences, with each paragraph limited to the development of one principal idea, can best emphasize the main points in the answer. Each principal idea should be placed in the first sentence of the paragraph, followed by supporting concepts and examples.
2. **Conciseness.** Candidates should present complete thoughts in the fewest possible words while ensuring important points are covered adequately. Short sentences and simple wording also contribute to concise writing.
3. **Clarity.** A clearly written response prevents uncertainty about the candidate's meaning or reasoning. Clarity involves using words with specific meanings, including proper technical terminology. Well-constructed sentences also contribute to clarity.
4. **Use of Standard English.** Responses should be written using Standard English. Standard English is used to carry on the daily business of the nation. It is the language of business, industry, government, education, and the professions. Standard English is characterized by exacting standards of punctuation and capitalization, by accurate spelling, by exact diction, by an expressive vocabulary, and by knowledgeable choices.
5. **Responsiveness to the Requirements of the Question.** Answers should address the requirements of the question directly and demonstrate the candidate's awareness of the purpose of the writing task. Responses should not be broad expositions on the general subject matter.
6. **Appropriateness for the Reader.** Writing appropriate for the reader takes into account the reader's background, knowledge of the subject, interests and concerns. Some questions may ask candidates to prepare a document for a certain reader, such as an engagement memorandum for a CPA's client.

MENTAL AND TECHNICAL PREREQUISITES FOR SUCCESS ON THE CPA EXAM

The exam is a test of your overall technical competency, a test to measure judgment and intelligence in the application of accounting principles, auditing standards, and procedures to practical problems, and to evaluate professional ethics. You are being tested on a basic level of knowledge in a broad spectrum of areas.

Your preparation should be geared to obtaining three things:

- **A Basic Technical Knowledge in All Areas.** The emphasis here is on basics. You don't need to know all the intricacies involved in any particular subject. What you do need to know are the major issues involved and you need to have a solid understanding of the underlying principles and concepts so you can respond to different types of questions and unfamiliar fact patterns.
- **Exam-Taking Skills.** You need weapons. You need exam-taking skills and techniques for each subject area. These will allow you to win the maximum amount of points in the shortest amount of time. The only way you can develop your skill is to **PRACTICE** by working hundreds of exam questions in each topic area so that answering them correctly becomes second nature. Also, don't forget to demonstrate good writing skills on all essay responses.
- **Confidence.** When you walk into that exam, you must be confident. This confidence will come as a by-product of the above two elements. To quote a former successful Lambers student, "Study the material,.....solve as many multiple-choice questions as your schedule permits. Although this is a very difficult exam, do not get discouraged. If you are prepared....you will pass this exam."

Strategies for Answering Objective Questions

- 1.) Cover (or do not look) at the answers. They are sometimes misleading and may confuse you before you have worked the question. Covering the answers keeps you from turning one simple question into four true or false questions. Also, in many cases, two or more choices may look plausible (and in fact, both may be technically correct), but you are asked to pick the best answer. For these reasons, it is critical that you cover the answers so you can think and formulate your own response first.
- 2.) Read the last sentence first. Generally, this will tell you the requirements.
- 3.) Decide on your answer or perform the appropriate calculations if a numerical response is required--still not looking at the answers.

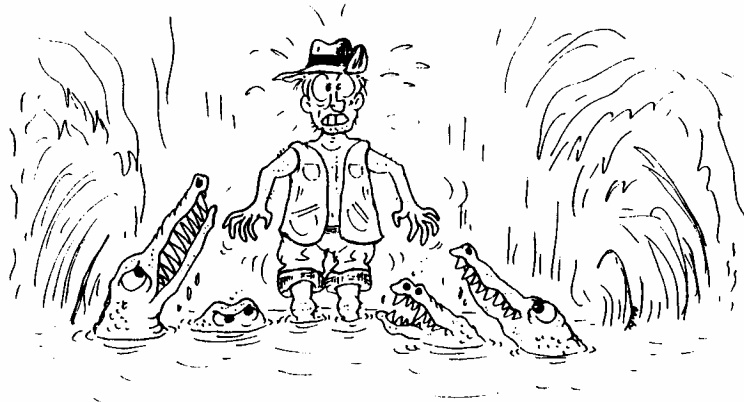
Read the alternatives. If one agrees with yours, select it and move on. If your answer is close, see if it is due to a procedural error. If your answer is totally out of line, reread the requirements and body to see what was missed. If all else fails, try to eliminate any answer choices and make your best guess.

General Comments and Pitfalls to Avoid

- 1.) Work individual questions in order. Make sure you answer everything. Remember, there is no penalty for guessing.
- 2.) Watch for wrong-choice indicators; words like, "always," "never," "only," "under no circumstances," "identical," etc. These words are usually there for a reason...and that's to indicate the incorrect answer.
- 3.) Watch for negatively stated questions. For example, "Which of the following is not a characteristic of effective internal control?"

Goal Setting: Your goal is to become a CPA, a professional. That will mean financial security, the opportunity for more fulfilling positions, possibly the opportunity to start your own firm. Keep your ultimate goals in mind as you begin. You must stay focused throughout your preparation period, and work every day to make that goal a reality.

Visualize your Goal: In the flux of daily life, it's easy to lose sight of your goals. As the saying goes, "When you're knee-high in alligators, it's easy to forget your objective was to drain the swamp." You need to visualize your goals on a daily basis. Picture yourself sitting in a plush office as the CFO of a major company, or imagine yourself owning your own firm. Expect to achieve your goal; keep a positive attitude.



Organization and Focus: Focus on your objective; do not let minor things distract you. Organize your life to accommodate the time you need to devote to preparation.

Discipline: This means studying when you feel like it and when you don't. Passing the CPA exam is earned day in and day out. You cannot neglect studying and cram for the exam. One more helpful hint....do you really want to go through the whole process over again if you don't stick with it and do it right the first time?

Make the commitment, and good luck with your studies!

Benefits of Becoming a CPA

First, a little background on the Certified Public Accountant (CPA) designation. The first CPA examination was offered in the state of New York in 1896* and shortly thereafter other states offered an examination for candidates aspiring to be CPA's. Now all states and territories offer examinations for those wishing to become CPA's. Unlike many other professional designations, CPA's are licensed by the state(s) to practice the "attest to" function. This allows the CPA to attest, in the form of an opinion, as to the condition of the financial statements provided by management. The CPA's opinion may vary from outright refusal to be associated with the statements to acceptance of the statements as fairly representing the financial condition of the enterprise. In carrying out the attest function and other work, the CPA must adhere to certain auditing standards of performance including, but not limited to, independence and designated audit procedures.

The attest function carries with it a heavy responsibility because the CPA's opinion is heavily relied upon by leaders, investors and others who have an interest in the condition of a particular enterprise. Besides the attest function, the CPA's association with other work, such as tax work, carries with it a presumption of excellence because of the standards that are required of CPA's.

Individuals who are CPA's are looked up to in the world of finance and industry especially where accountability is a factor, which is almost always the case. Whether the CPA is in public practice or in an executive position, the designation is recognized as a standard of excellence. Naturally, enterprises in general are willing to pay for the presumption of excellence that the CPA demonstrates, which for the individual results in increased income.

Using the world-famous cliché, the "bottom line" is that the CPA enjoys prestige, higher income, financial security and independence to a much greater extent than the same person without it.

Vincent W. Lambers
President, Lambers CPA Review

*An excerpt from the New York State Certified Public Accountant Examination, December 1896, a Theory of Accounts question with full answer:

I. State the essential principles of double entry bookkeeping and show wherein it differs from single entry bookkeeping.

The essential principles of double entry bookkeeping are, (1) The record of every transaction involving the transfer of money or its equivalent must appear on both the debit and credit side of the ledger, thus maintaining it in balance. (2) Provision must be made for the constant differentiation under properly classified accounts of capital and revenue income and expenditure. (3) As resulting therefrom, the profit or loss determined from the collection of the preponderance of the balance of the revenue accounts must be proved by the excess of the assets over the liabilities as exhibited in the balance sheet.

The fundamental difference between single and double entry bookkeeping is this: In single entry the income and expenditure accounts are not kept, and the profit or loss for any given period is determinable solely from a comparison of the assets with the liabilities—the excess of the one over the other showing the profit or loss; the proof of the accuracy of same, though the same result being arrived at through the profit and loss account being entirely wanting.

Of minor importance also is the fact that the mathematical accuracy of the posting is in single entry bookkeeping undemonstrable in trial balance form, as in double entry.

CPA EXAMINATION: CONTENT SPECIFICATION OUTLINE

AUDITING & ATTESTATION CONTENT SPECIFICATION OUTLINE

I. PLAN THE ENGAGEMENT, EVALUATE THE PROSPECTIVE CLIENT AND ENGAGEMENT, DECIDE WHETHER TO ACCEPT OR CONTINUE THE CLIENT AND THE ENGAGEMENT, AND ENTER INTO AN AGREEMENT WITH THE CLIENT (22% - 28%)

- A. Determine nature and scope of engagement
 - 1. Auditing standards generally accepted in the United States of America (GAAS)
 - 2. Standards for accounting and review services
 - 3. Standards for attestation engagements
 - 4. Compliance auditing applicable to governmental entities and other recipients of governmental financial assistance
 - 5. Other assurance services
 - 6. Appropriateness of engagement to meet client's needs
- B. Assess engagement risk and the CPA firm's ability to perform the engagement
 - 1. Engagement responsibilities
 - 2. Staffing and supervision requirements
 - 3. Quality control considerations
 - 4. Management integrity
 - 5. Researching information sources for planning and performing the engagement
- C. Communicate with the predecessor accountant or auditor
- D. Decide whether to accept or continue the client and engagement
- E. Enter into an agreement with the client about the terms of the engagement
- F. Obtain an understanding of the client's operations, business, and industry
- G. Perform analytical procedures
- H. Consider preliminary engagement materiality
- I. Assess inherent risk and risk of misstatements from errors, fraud, and illegal acts by clients
- J. Consider other planning matters
 - 1. Using the work of other independent auditors
 - 2. Using the work of a specialist
 - 3. Internal audit function
 - 4. Related parties and related party transactions
 - 5. Electronic evidence
 - 6. Risks of auditing around the computer
- K. Identify financial statement assertions and formulate audit objectives
 - 1. Significant financial statement balances, classes of transactions, and disclosures
 - 2. Accounting estimates
- L. Determine and prepare the work program defining the nature, timing, and extent of the procedures to be applied.

II. CONSIDER INTERNAL CONTROL IN BOTH MANUAL AND COMPUTERIZED ENVIRONMENTS (12% - 18%)

- A. Obtain an understanding of business processes and information flows
- B. Identify controls that might be effective in preventing or detecting misstatements
- C. Document an understanding of internal control
- D. Consider limitations of internal control
- E. Consider the effects of service organizations on internal control
- F. Perform tests of controls
- G. Assess control risk

III. OBTAIN AND DOCUMENT INFORMATION TO FORM A BASIS FOR CONCLUSIONS (32% - 38%)

- A. Perform planned procedures
 - 1. Applications of audit sampling
 - 2. Analytical procedures
 - 3. Confirmation of balances and/or transactions with third parties
 - 4. Physical examination of inventories and other assets
 - 5. Other tests of details

- 6. Computer-assisted audit techniques, including data interrogation, extraction and analysis
 - 7. Substantive tests before the balance sheet date
 - 8. Tests of unusual year-end transactions
 - B. Evaluate contingencies
 - C. Obtain and evaluate lawyers' letters
 - D. Review subsequent events
 - E. Obtain representations from management
 - F. Identify reportable conditions and other control deficiencies
 - G. Identify matters for communication with audit committees
 - H. Perform procedures for accounting and review services engagements
 - I. Perform procedures for attestation engagements
- IV. REVIEW THE ENGAGEMENT TO PROVIDE REASONABLE ASSURANCE THAT OBJECTIVES ARE ACHIEVED AND EVALUATE INFORMATION OBTAINED TO REACH AND TO DOCUMENT ENGAGEMENT CONCLUSIONS (8% -12%)
- A. Perform analytical procedures
 - B. Evaluate the sufficiency and competence of audit evidence and document engagement conclusions
 - C. Evaluate whether financial statements are free of material misstatements
 - D. Consider whether substantial doubt about an entity's ability to continue as a going concern exists
 - E. Consider other information in documents containing audited financial statements
 - F. Review the work performed to provide reasonable assurance that objectives are achieved
- V. PREPARE COMMUNICATIONS TO SATISFY ENGAGEMENT OBJECTIVES (12% -18%)
- A. Reports
 - 1. Reports on audited financial statements
 - 2. Reports on reviewed and compiled financial statements
 - 3. Reports required by Government Auditing Standards
 - 4. Reports on compliance with laws and regulations
 - 5. Reports on internal control
 - 6. Reports on prospective financial information
 - 7. Reports on agreed-upon procedures
 - 8. Reports on the processing of transactions by service organizations
 - 9. Reports on supplementary financial information
 - 10. Special reports
 - 11. Reports on other assurance services
 - 12. Reissuance of reports
 - B. Other required communications
 - 1. Errors and fraud
 - 2. Illegal acts
 - 3. Communications with audit committees
 - 4. Other reporting considerations covered by statements on auditing standards and statements on standards for attestation engagements
 - C. Other matters
 - 1. Subsequent discovery of facts existing at the date of the auditor's report
 - 2. Consideration after the report date of omitted procedures

FINANCIAL ACCOUNTING & REPORTING CONTENT SPECIFICATION OUTLINE

I. CONCEPTS AND STANDARDS FOR FINANCIAL STATEMENTS (17% -23%)

- A. Financial accounting concepts
 - 1. Process by which standards are set and roles of standard-setting bodies
 - 2. Conceptual basis for accounting standards
- B. Financial accounting standards for presentation and disclosure in general-purpose financial statements
 - 1. Consolidated and combined financial statements
 - 2. Balance sheet
 - 3. Statement(s) of income, comprehensive income and changes in equity accounts
 - 4. Statement of cash flows
 - 5. Accounting policies and other notes to financial statements
- C. Other presentations of financial data (financial statements prepared in conformity with comprehensive bases of accounting other than GAAP)
- D. Financial statement analysis

II. TYPICAL ITEMS: RECOGNITION, MEASUREMENT, VALUATION, AND PRESENTATION IN FINANCIAL STATEMENTS IN CONFORMITY WITH GAAP (27% -33%)

- A. Cash, cash equivalents and marketable securities
- B. Receivables
- C. Inventories
- D. Property, plant, and equipment
- E. Investments
- F. Intangibles and other assets
- G. Payables and accruals
- H. Deferred revenues
- I. Notes and bonds payable
- J. Other liabilities
- K. Equity accounts
- L. Revenues, cost, and expense accounts

III. SPECIFIC TYPES OF TRANSACTIONS AND EVENTS: RECOGNITION, MEASUREMENT, VALUATION, AND PRESENTATION IN FINANCIAL STATEMENTS IN CONFORMITY WITH GAAP (27% -33%)

- A. Accounting changes and corrections of errors
- B. Business combinations
- C. Contingent liabilities and commitments
- D. Discontinued operations
- E. Earnings per share
- F. Employee benefits, including stock options
- G. Extraordinary items
- H. Financial instruments, including derivatives
- I. Foreign currency transactions and translation
- J. Income taxes
- K. Interest costs
- L. Interim financial reporting
- M. Leases
- N. Non-monetary transactions
- O. Related parties
- P. Research and development costs
- Q. Segment reporting
- R. Subsequent events

IV. ACCOUNTING AND REPORTING FOR GOVERNMENTAL ENTITIES (8% -12%)

- A. Governmental accounting concepts
 - 1. Measurement focus and basis of accounting
 - 2. Fund accounting concepts and application
 - 3. Budgetary process
- B. Format and content of governmental financial statements
 - 1. Government-wide financial statements
 - 2. Governmental funds financial statements
 - 3. Conversion from fund to government-wide financial statements

4. Proprietary fund financial statements
 5. Fiduciary fund financial statements
 6. Notes to financial statements
 7. Required supplementary information, including management's discussion and analysis
 8. Comprehensive annual financial report (CAFR)
- C. Financial reporting entity including blended and discrete component units
- D. Typical items and specific types of transactions and events: recognition, measurement, valuation and presentation in governmental entity financial statements in conformity with GAAP
1. Net assets
 2. Capital assets and infrastructure
 3. Transfers
 4. Other financing sources and uses
 5. Fund balance
 6. Non-exchange revenues
 7. Expenditures
 8. Special items
 9. Encumbrances
- E. Accounting and financial reporting for governmental not-for-profit organizations
- V. ACCOUNTING AND REPORTING FOR NONGOVERNMENTAL NOT-FOR-PROFIT ORGANIZATIONS (8% -12%)
- A. Objectives, elements and formats of financial statements
1. Statement of financial position
 2. Statement of activities
 3. Statement of cash flows
 4. Statement of functional expenses
- B. Typical items and specific types of transactions and events: recognition, measurement, valuation and presentation in the financial statements of not-for-profit organizations in conformity with GAAP
1. Revenues and contributions
 2. Restrictions on resources
 3. Expenses, including depreciation and functional expenses
 4. Investments

REGULATION CONTENT SPECIFICATION OUTLINE

- I. ETHICS AND PROFESSIONAL AND LEGAL RESPONSIBILITIES (15% -20%)
 - A. Code of Professional Conduct
 - B. Proficiency, independence, and due care
 - C. Ethics and responsibilities in tax practice
 - D. Licensing and disciplinary systems imposed by the profession and state regulatory bodies
 - E. Legal responsibilities and liabilities
 - 1. Common law liability to clients and third parties
 - 2. Federal statutory liability
 - F. Privileged communications and confidentiality
- II. BUSINESS LAW (20% -25%)
 - A. Agency
 - 1. Formation and termination
 - 2. Duties and authority of agents and principals
 - 3. Liabilities and authority of agents and principals
 - B. Contracts
 - 1. Formation
 - 2. Performance
 - 3. Third-party assignments
 - 4. Discharge, breach, and remedies
 - C. Debtor-creditor relationships
 - 1. Rights, duties, and liabilities of debtors, creditors, and guarantors
 - 2. Bankruptcy
 - D. Government regulation of business
 - 1. Federal securities acts
 - 2. Other government regulation (antitrust, pension and retirement plans, union and employee relations, and legal liability for payroll and social security taxes)
 - E. Uniform commercial code
 - 1. Negotiable instruments and letters of credit
 - 2. Sales
 - 3. Secured transactions
 - 4. Documents of title and title transfer
 - F. Real property, including insurance
- III. FEDERAL TAX PROCEDURES AND ACCOUNTING ISSUES (8% -12%)
 - A. Federal tax procedures
 - B. Accounting periods
 - C. Accounting methods including cash, accrual, percentage of completion, completed contract, and installment sales
 - D. Inventory methods, including uniform capitalization rules
- IV. FEDERAL TAXATION OF PROPERTY TRANSACTIONS (8% -12%)
 - A. Types of assets
 - B. Basis of assets
 - C. Depreciation and amortization
 - D. Taxable and nontaxable sales and exchanges
 - E. Income, deductions, capital gains and capital losses, including sales and exchanges of business property and depreciation recapture
- V. FEDERAL TAXATION – INDIVIDUALS (12% -18%)
 - A. Gross income—inclusions and exclusions
 - B. Reporting of items from pass-through entities, including passive activity losses
 - C. Adjustments and deductions to arrive at taxable income
 - D. Filing status and exemptions
 - E. Tax computations, credits, and penalties
 - F. Alternative minimum tax
 - G. Retirement plans
 - H. Estate and gift taxation, including transfers subject to the gift tax, annual exclusion, and items includible and deductible from gross estate

VI. FEDERAL TAXATION—ENTITIES (22% -28%)

- A. Similarities and distinctions in tax reporting among such entities as sole proprietorships, general and limited partnerships, Subchapter C corporations, Subchapter S corporations, limited liability companies, and limited liability partnerships
- B. Subchapter C corporations
 - 1. Determination of taxable income and loss, and reconciliation of book income to taxable income
 - 2. Tax computations, credits, and penalties, including alternative minimum tax
 - 3. Net operating losses
 - 4. Consolidated returns
 - 5. Entity/owner transactions, including contributions and distributions
- C. Subchapter S corporations
 - 1. Eligibility and election
 - 2. Determination of ordinary income, separately stated items, and reconciliation of book income to taxable income
 - 3. Basis of shareholder's interest
 - 4. Entity/owner transactions, including contributions and liquidating and nonliquidating distributions
 - 5. Built-in gains tax
- D. Partnerships
 - 1. Determination of ordinary income, separately stated items, and reconciliation of book income to taxable income
 - 2. Basis of partner's interest and basis of assets contributed to the partnership
 - 3. Partnership and partner elections
 - 4. Partner dealing with own partnership
 - 5. Treatment of partnership liabilities
 - 6. Distribution of partnership assets
 - 7. Ownership changes and liquidation and termination of partnership
- E. Trusts
 - 1. Types of trusts
 - 2. Income and deductions
 - 3. Determination of beneficiary's share of taxable income

BUSINESS ENVIRONMENT & CONCEPTS CONTENT SPECIFICATION OUTLINE

I. BUSINESS STRUCTURE (17%-23%)

- A. Advantages, implications, and constraints of legal structures for business
 - 1. Sole proprietorships and general and limited partnerships
 - 2. Limited liability companies (LLC), limited liability partnerships (LLP), and joint ventures
 - 3. Subchapter C and subchapter S corporations
- B. Formation, operation, and termination of businesses
- C. Financial structure, capitalization, profit and loss allocation, and distributions
- D. Rights, duties, legal obligations, and authority of owners and management (directors, officers, stockholders, partners, and other owners)

II. ECONOMIC CONCEPTS ESSENTIAL TO OBTAINING AN UNDERSTANDING OF AN ENTITY'S BUSINESS AND INDUSTRY (8% -12%)

- A. Business cycles and reasons for business fluctuations
- B. Economic measures and reasons for changes in the economy, such as inflation, deflation and interest rate changes
- C. Market influences on business strategies, including selling, supply chain, and customer management strategies
- D. Implications to business of dealings in foreign currencies, hedging and exchange rate fluctuations

III. FINANCIAL MANAGEMENT (17% -23%)

- A. Financial modeling, including factors such as financial indexes, taxes and opportunity costs, and models such as economic value added, cash flow, net present value, discounted payback, and internal rate of return
 - 1. Objectives
 - 2. Techniques
 - 3. Limitations
- B. Strategies for short-term and long-term financing options, including cost of capital and derivatives
- C. Financial statement and business implications of liquid asset management
 - 1. Management of cash and cash equivalents, accounts receivable, accounts payable, and inventories.
 - 2. Characteristics and financial statement and business implications of loan rates (fixed vs. variable) and loan covenants

IV. INFORMATION TECHNOLOGY (IT) IMPLICATIONS IN THE BUSINESS ENVIRONMENT (22% -28%)

- A. Role of business information systems
 - 1. Reporting concepts and systems
 - 2. Transaction processing systems
 - 3. Management reporting systems
 - 4. Risks
- B. Roles and responsibilities within the IT function
 - 1. Roles and responsibilities of database/network/Web administrators, computer operators, librarians, systems programmers and applications programmers
 - 2. Appropriate segregation of duties
- C. IT fundamentals
 - 1. Hardware and software, networks, and data structure, analysis, and application, including operating systems, security, file organization, types of data files, and database management systems
 - 2. Systems operation, including transaction processing modes, such as batch, on-line, real-time, and distributed processing, and application processing phases, such as data capture, edit routines, master file maintenance; reporting, accounting, control, and management; query, audit trail, and ad hoc reports; and transaction flow

- D. Disaster recovery and business continuity, including data backup and data recovery procedures, alternate processing facilities (hot sites), and threats and risk management
- E. Financial statement and business implications of electronic commerce, including electronic fund transfers, point of sale transactions, internet-based transactions and electronic data interchange
- V. PLANNING AND MEASUREMENT (22% -28%)
 - A. Planning and budgeting
 - 1. Planning techniques, including strategic and operational planning
 - 2. Forecasting and projection techniques
 - 3. Budgeting and budget variance analysis
 - B. Performance measures
 - 1. Organizational performance measures, including financial and nonfinancial scorecards
 - 2. Benchmarking, including quality control principles, best practices, and benchmarking techniques
 - C. Cost measurement
 - 1. Cost measurement concepts (standard, joint product, and by-product costing)
 - 2. Accumulating and assigning costs (job order, process, and activity-based costing)
 - 3. Factors affecting production costs

Chapter One

Non-Corporate Entities

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Chapter One

Non-Corporate Entities

SOLE PROPRIETORSHIPS

This is the simplest form of business organization and the easiest to begin and to terminate.

The proprietor furnishes all the capital, receives all the profits and owns all the property of the proprietorship. Proprietors can sue and be sued. Their personal assets are at risk. The proprietor is taxed as an individual and reports sales and expenses on Schedule C of Form 1040 for Federal tax purposes.

Proprietorships do not necessarily do business in their owner's name. If not, they may be required under state law to file a d/b/a "doing business as" disclosure.

A proprietorship endures at the will of the owner, but is automatically terminated upon the proprietor's death.

Advantage: Simplicity, ability to do business across state or national boundaries.

Disadvantage: Lack of capital and management skills and depth.

PARTNERSHIPS

Summary of Significant Changes in the Revised Uniform Partnership Act (RUPA) Which Simplify Partnership Law

Prior law generally viewed partnerships as a collection of the partners and perhaps a legal entity. RUPA states that a general partnership is a legal entity that can own and convey property, and sue and be sued in its own name. Under RUPA, a partnership is an entity distinct from its partners resulting in greater partnership stability. No partner has an interest in specific partnership property.

Partnerships do not have perpetual existence like corporations, but nearly so since the partnership continues in existence when one or more partners leave. Formerly, the partnership was dissolved by the exit, for whatever reason, of any partner.

RUPA is a default act, meaning that it generally applies in situations not covered in the partnership agreement. The partnership agreement, however, may not override the default rule to eliminate a partner's duty of loyalty or obligation of good faith and fair dealing, or unreasonably reduce a partner's duty of care.

In most states, requirements are specified for filing, amending and canceling partnership agreements. However, there are no required filings under RUPA.

Generally, filing may be made for:

1. a statement of partnership authority
2. a statement of denial of partnership authority
3. a statement of dissociation
4. a statement of dissolution
5. a statement of merger

Partners are jointly and severally liable for all partnership obligations. Property taken by a partner improperly from a third party is the responsibility of the partnership even if the partnership never received the property.

A partnership agreement may be in writing, oral or implied. The partnership has no duty to have books and records; however, if the partnership does have books and records, they must be maintained at the partnership's principal

office. Partners have the right to partnership information, including inspection of books and records, if any, under reasonable circumstances.

Creditors of a partner may attach the interest of a partner, but may not attach specific partnership property. Creditors may be assigned rights to a partner's interest, but have no rights to partnership property, only earnings and/or distributions made to the debtor partner. Creditors assigned rights to a partner's profits are responsible for the income taxes thereon, whether cash is distributed or not.

GENERAL PARTNERSHIPS

1. A partnership is an association of two or more co-owners of a business for profit.
 - a. Must have two or more persons (can be a person, corporation, partnership, estate, trust, joint venture, or government agency). Person includes any commercial entity that is legal.
 - b. Must have co-ownership of a business:
 - 1) Two key factors are sharing of profits and sharing of management.
 - 2) The parties must be co-owners of a business, not co-owners of property.
 - c. Must be a business operated for profit (e.g. social clubs, religious organizations or associations are not partnerships).
2. A partnership is formed by an agreement of all partners to conduct the business.
 - a. The partnership agreement may be oral, implied or in writing:
 - 1) Partnerships impossible to perform in one year require a writing (e.g., *A, B and C form ABC partnership and agree that it will not terminate for 5 years.*)
 - 2) Limited partnerships and limited liability companies require a writing.
 - 3) A written partnership agreement (sometimes called the articles of partnership) can only be amended by unanimous consent of all partners.
 - b. If a partner breaches the partnership agreement, (s)he is liable.
3. A partnership may also be created from the conduct of the parties (e.g., if two or more parties are co-owners of a business and share profits, they may be a partnership even though they did not consider themselves to be a partnership)
4. Under RUPA, a partnership is considered to be a separate entity.
 - a. It is subject to Worker's Compensation, FICA, FUTA, etc.
 - b. It is a separate entity for ownership of property (e.g. *ABC partnership may own real estate in the name of the partnership.*)
 - c. Assets of the firm are considered separate and distinct from the assets of individual partners.
 - d. Partnerships do not pay income tax. They file an information return on Form 1065 reporting sales, expenses, and partnership income. All items of partnership income or loss flow through to the individual returns of the partners.
 - e. Unlike a corporation, a partnership does not have perpetual existence and the departure of a partner does not ordinarily dissolve the partnership. (see section on dissolution and dissociation)

GENERAL PARTNERS' RESPONSIBILITIES

1. Partners in a general partnership have unlimited personal liability
 - a. General partners are **jointly liable** for all partnership debts and contract obligations (joint liability means all partners must be sued as a group).
 - b. They are **jointly and severally** liable for all partnership torts (joint and several liability means all partners may be sued as a group **or** sued individually).
2. General partners are agents of the partnership and agents of each other.
 - a. Partners owe the same duties that all agents do.
 - 1) Owe a duty of **Obedience** to partnership agreements.
 - 2) Owe a duty of **Due care** to fellow partners and the partnership.

- 3) Owe a duty to **Inform** their fellow partners of relevant facts.
 - 4) Owe a duty to **Account** for all money and property received or expended.
 - 5) Owe a fiduciary duty of **Loyalty** to the partnership and each other (e.g., cannot compete with the partnership or make a profit at the expense of the partnership).
- b. When acting with **real or apparent authority**, each partner can impose contract liability on the partnership and on their fellow partners.
 - c. Any partner committing a tort while acting on partnership business imposes tort liability on himself, the partnership and fellow partners (**respondeat superior**).
 - d. Each must give **actual notice to old customers and published notice to new customers** upon their termination from the partnership.

PARTNER'S RIGHTS

1. **Each partner has an equal right to participate in the management of the business, unless the partners specifically agree otherwise.**
 - a. Most decisions require only a majority vote.
 - b. Unless otherwise agreed, the following require unanimous consent of all partners:
 - 1). admit new general partners or new limited partners
 - 2). transfer partnership property to others
 - 3). change a written partnership agreement
 - 4). change the capital of the firm
 - 5). admit liability in a law suit (confess a judgment) or submit a claim to arbitration
 - 6). make a fundamental change in partnership business to specifically include selling the partnership's goodwill
2. **Each partner has an equal right to share in distributions, unless otherwise agreed.**
 - a. Unless otherwise agreed, profits and losses are split equally:
 - 1). The partners may specify an unequal division of profits and losses (e.g. *A, B* and *C* agree profits and losses will be split 60% for *A*, 30% for *B* and 10% for *C*).
 - 2). If a division of profits is specified but not losses, losses will follow profits.
 - b. Unless otherwise agreed, a partner is not entitled to compensation
3. **Each partner has the right to be reimbursed for loans and advances made to the partnership and for payments made on behalf of the partnership plus interest.**
 - a. Partners also have the right to be indemnified for liability incurred while properly acting on behalf of the partnership.
 - b. A partner entitled to repayment is only paid after all other creditors are paid.
4. **All partners and limited partners have the right to full information about the partnership.**
 - a. They have the right to inspect and copy books and records at reasonable times.
 - b. A partner has the right to demand a formal account (a complete review of all financial transactions of the partnership, including financial statements).
 - 1). An accounting is granted when circumstances make it just and reasonable.
 - 2). e.g. breach of fiduciary duties or wrongful exclusion from the partnership.
5. **Each partner is a co-owner of partnership property.**
 - a. Each has an equal right to use partnership property for partnership purposes, but has no right to use it for any other purpose without the consent of other partners.
 - b. A partner cannot transfer or assign his/her individual interest in partnership property to others. No partner has an individual interest in partnership property.
 - c. Partnership property may not be attached by an individual partner's creditors.
 - d. If a partner dies, partnership property remains as partnership property (entity concept), not the heirs. A deceased partner's interest is part of his/her estate. A partner's estate has no continuing interest in the business.

6. **Power of dissociation**

A partner has the right to dissociate him/herself from the partnership. Dissociated partner must serve notice to the remaining partners of dissociation and is responsible for all partnership acts and debts up until dissociation. Third parties must be made aware of dissociation. If not, the dissociated partner is liable for third parties damaged on the assumption of partner's continuance in the partnership.

7. **The "In Kind" Rule**

Partners have the right to receive cash distributions (profits or liquidation payments) and may not be paid "in kind" unless otherwise agreed. Partners similarly have no right to demand payment in kind. Creditors may be paid "in kind" if agreed.

ASSIGNING A PARTNERSHIP INTEREST

1. Any general or limited partner may assign or sell their partnership interest.
 - a. An assignment does not dissolve partnership.
 - b. Thus, the assignor remains a partner and is still liable for partnership debts.
 - c. The consent of other partners is not required, unless otherwise agreed.
2. The assignee does not become a partner without the consent of all other partners.
 - a. The **only right** an assignee gets is the right to receive assignor's share of profits if any (**e.g.** assignee does not have a right to vote, manage or to inspect partnership books).
 - b. The assignee is not liable for the assignor's share of losses.
3. A creditor of an individual partner may obtain from a court a **charging order** against an individual partner's share of profits. This is the **only right** the creditor receives.
 - a. The creditor cannot attach the partner's interest in partnership property.
 - b. A charging order does not cause a dissolution of the partnership.
 - c. A charging order does not make the creditor a partner and does not allow the creditor to vote, participate in management or obtain partnership information.
 - d. A charging order gives the creditor essentially the same rights as an assignee.
 - e. Assignees are entitled to partnership profits, and are responsible for the income taxes thereon. Profits with no money being distributed are a deterrent to charging orders.

PARTNER DISSOCIATION

Dissociation is the act of a partner leaving the partnership. Dissociation will lead to either a buyout of the partner's interest, or dissolution and winding up of the partnership.

A partner is dissociated from a partnership upon the occurrence of **any** of the following events:

1. The partnership's having notice of the partner's express will to withdraw as a partner or on a later date specified by the partner;
2. An event agreed to in the partnership agreement as causing the partner's dissociation;
3. The partner's expulsion pursuant to the partnership agreement;
4. The partner's expulsion by the unanimous vote of the other partners if:
 - a. it is unlawful to continue with that partner.
 - b. there has been a transfer of the partner's transferable interest or a court order charging the partner's interest.
 - c. Within 90 days after the partnership notifies a corporate partner that it will be expelled because of dissolution, revoked charter or its right to conduct business has been suspended.
 - d. A partnership that is a partner has been dissolved and its business is being wound up.

5. On application by the partnership or another partner, the partner's expulsion by judicial determination because:
 - a. The partner engaged in wrongful conduct.
 - b. The partner committed a material breach of the partnership agreement.
 - c. Conduct by partner makes it not practical to continue with that partner.
6. The partner
 - a. Becoming a debtor in bankruptcy
 - b. Executing an assignment for creditors
 - c. Potential or actual appointment of custodian of all or mostly all of partner's property. Partner has 90 days to stay appointment of trustee, receiver or liquidator.
7. In the case of a partner who is an individual,
 - a. Partner's death.
 - b. The appointment of a guardian for the partner; or
 - c. Judicial determination that partner is not capable of carrying on duties under partnership agreement.
8. Transfer of the entire transferable interest in a trust or estate that is a partner.

A partner has the power to dissociate at any time, rightfully or wrongfully. It is wrongful only if

1. It is a breach of the partnership agreement.
2. For a term partnership or partnership for a particular undertaking before completion of term or undertaking; e.g., partner who is chief engineer of a bridge project quits when bridge is 50% complete.
 - a. The partner withdraws by express will, except if the partner dissociating follows within 90 days of another partner's dissociation by death or otherwise it is not wrongful.
 - b. A partner is expelled by judicial determination.
 - c. The partner is a debtor in bankruptcy.

A partner who wrongfully dissociates is liable to the partnership and to the other partners for damages caused by the dissociation.

Note above that item 2 is a default rule in RUPA applying only if the issue is not addressed in the partnership agreement.

Effect of Partner's Dissociation

1. The right to participate in management terminates.
2. The partner's duty of loyalty terminates.
3. The partner's duty of loyalty and care continue only with regard to matters arising and events occurring before dissociation.

PURCHASE OF DISSOCIATED PARTNER'S INTEREST

If dissociation occurs without resulting in dissolution, the partnership has the right to continue the business and the dissociated partner has the right to be paid the value of his interest. In this case the buyout is mandatory. The buyout may be by the partnership, one or more remaining partners or a third party acceptable to the remaining partners.

The buyout price is the amount, on the date of dissociation, as if the assets of the partnership were sold at a price equal to the greater of liquidation value or going concern value without the departing partner. The partnership must pay interest from the date of dissociation to the date of payment. This is a default rule. If the partnership agreement fixes the method of calculating payment, that will be used.

The partnership may offset against the buyout price all amounts due from the dissociated partner including amounts due for wrongful dissociation.

If the dissociated partner does not agree with the partnership's stipulated buyout price and no agreement is reached after 120 days, the dissociated partner shall receive the partnership's offer in cash as the undisputed minimum value and may thereafter bring suit to achieve a higher buyout price.

DISSOCIATED PARTNER'S LIABILITY TO OTHER PERSONS

A partner who dissociates without causing a dissolution is liable as a partner to the other party in a transaction entered into by the partnership before dissociation for a period of two years after dissociation.

Further, for a period of two years a dissociating partner is liable to third parties if they act after dissociation believing that the departed partner is a member of the partnership. A statement of dissociation operates conclusively as constructive notice to third parties 90 days after filing.

EVENTS CAUSING DISSOLUTION AND WINDING UP OF PARTNERSHIP BUSINESS

A partnership is dissolved and its business must be wound up under any of the following:

1. Notice from a partner they wish to withdraw in a **partnership at will** and that partner has not dissociated prior to such notice. "Partnership at will" means a partnership in which the partners have not agreed to remain partners until the expiration of a definite term or the completion of a particular undertaking.
2. For term partnerships:
 - a. Within 90 days after a partner's dissociation by death or otherwise, and at least half the remaining partners express their will to dissolve and wind up the business.
 - b. The express will of all the partners to wind up the business.
 - c. Expiration of the term or completion of the undertaking.
3. An event occurs agreed to in the partnership agreement resulting in the winding up of the business.
4. An event that makes it unlawful for all or substantially all of the business to continue.
5. On application by a partner, a judicial determination that continuation of the business is not practical.
6. On application by a transferee of a partner's transferable interest, a judicial determination that it is equitable to wind up the business.

A partnership continues after dissolution only for the purpose of winding up its business. After winding up is complete, the partnership is terminated.

At any time after dissolution of a partnership and before the winding up is completed, all the partners, including any dissociating partner other than a wrongfully dissociating partner, may waive the right to have the business wound up and the partnership terminated.

In that event, the partnership resumes as if dissolution had not occurred. In this process, third parties are protected.

A partnership is bound by a partner's act after dissolution that is necessary for winding up partnership affairs, or would have bound the partnership before dissolution if the other party did not have notice of the dissolution.

Note: Third parties are assumed to have notice 90 days after the filing of a Statement of Dissolution.

DISTRIBUTION UPON DISSOLUTION – GENERAL PARTNERSHIPS

Creditors have first claim on partnership assets. Partners who are creditors have equal claim with other creditors under RUPA; however, since partners are responsible for partnerships debts, creditors in reality are paid first.

The second order of distribution is to settle partner's accounts with credit balances (equity) with no distinction being made between capital and/or profits.

Finally, partners who have debit balances in their capital account are required to contribute the balance. If a partner does not/ or cannot (e.g. bankruptcy) contribute sufficient funds to erase a debit balance, the remaining partners are liable.

LIMITED PARTNERSHIPS

1. A **limited partnership** is a partnership of two or more parties formed in compliance with a state statute with the express purpose of permitting limited partners to share in partnership profits without the risk of personal liability.
 - a. There must be one or more general partners and one or more limited partners:
 - 1). A general partner in a limited partnership has the same rights and duties that a general partner in a general partnership has.
 - 2). A limited partner has few duties and limited liability.
 - b. **But**, a general partner may also be a limited partner in the same partnership.
 - c. A certificate of limited partnership must be filed with the state and must contain:
 - 1). the name and address of the limited partnership, which must include the words "limited partnership"
 - 2). the names, addresses and signatures of all general partners
 - 3). the latest date the limited partnership will dissolve
 - 4). the name and address of its registered agent
 - d. The certificate of limited partnership must be amended if a new general partner is admitted or withdraws or if any information in the certificate becomes untrue.
2. Liability in a limited partnership:
 - a. General partners have unlimited personal liability.
 - b. Limited partners have no liability beyond their capital contribution:
 - 1). A limited partner's promise to contribute capital must be in writing.
 - 2). Limited partners are liable for any capital contribution not made.
 - c. Limited partners have no right to take part in the control or day-to-day management of the partnership:
 - 1). If they do participate in daily management, they are personally liable to any party reasonably believing they were a general partner.
 - 2). **rationale:** If you give the appearance to others that you are a general partner, then you are liable like a general partner (**apparent authority**).
 - 3). If the partnership name includes a limited partner's name, the limited partner is also liable to any creditor who didn't know they were a limited partner.
 - d. Limited partners may vote on the following without incurring liability:
 - 1). dissolution of the limited partnership
 - 2). fundamental changes in the limited partnership (**e.g.** sale of substantially all assets of the limited partnership or a major change in the nature of the business)
 - 3). admission or removal of a general or limited partner
 - 4). amending the certificate of limited partnership
3. Unless otherwise agreed, admitting new general or limited partners requires the unanimous written consent of all limited and general partners.

4. Limited and general partners may be secured or unsecured creditors of the partnership.
5. Limited partners have the right to inspect and copy partnership books and records to specifically include the right to receive copies of any partnership tax returns.

2001 LIMITED PARTNERSHIP ACT

- A limited partner is one who is designated as a limited partner in the partnership agreement.
- A general partner is one who is designated as a general partner in the partnership agreement.

LIMITED PARTNERSHIP

- Commonly referred to a “domestic” limited partnership. The act encompasses all prior limited partnerships which were designated as such under prior acts.
- It is of the essence of a limited partnership to have two classes of partners. Accordingly, there must be at least one limited and one general partner. The act provides that a limited partnership dissolves if its sole general partner or sole limited partner dissociates and the limited partnership fails to admit a replacement within 90 days. Two partners are required under the Act.
- Limited partnership means an entity having one or more general partners and one or more limited partners which is formed under the Act by two or more persons.
- Partnership agreement means the partnership agreement whether oral or implied, in a record or in any combination, concerning the limited partnership.
- Person means an individual, corporation, business trust, estate, trust, partnership, limited liability company, association, joint venture, government, government subdivision, agency, or instrumentality, public corporation, or any other legal or commercial entity.
- Person dissociated as a general partner means a person dissociated as a general partner of a limited partnership. Likewise with respect to limited partners.

LIMITED LIABILITY COMPANY (LLC)

1. A **Limited Liability Company (LLC)** is a cross between a partnership and a corporation and has been recognized in virtually every state in the U.S.
 - a. Most states require at least 2 members to form an **LLC**.
 - b. A few states permit a one person **LLC**.
2. A Limited Liability Company differs from other business forms in **three key areas**:
 - a. **LIABILITY ADVANTAGE:** Unlike partners, **LLC** owners (called **members**) have no personal liability beyond the amount of their investment in most cases (their limited liability is similar to a limited partner or corporate stockholder).
 - b. **PARTICIPATE IN MANAGEMENT:** An **LLC** owner may fully participate in management like partners (unlike limited partners or corporate stockholders who have limited management rights).
 - c. **FEDERAL TAX ADVANTAGE:** An **LLC** can have the same federal tax advantage of a partnership or S corporation (**i.e.** not subject to taxation on both the entity and profits distributed to members, like a corporation)
3. An **LLC** must file its **articles of organization** with the state:
 - a. Its name must clearly indicate the limited liability of its owners (**e.g.** use **L.L.C.**, **L.C.**, "**limited company**" or "**limited liability company**" after its name)
 - b. The agreement between **LLC** members governing the operation of the **LLC** is called an **operating agreement** (like a partnership agreement) and is not filed with the state.

4. There are two main methods of managing an **LLC**;
 - a. An **LLC** may be member managed.
 - 1). Unless otherwise agreed, each member has an equal right to manage.
 - 2). Each member has both actual and apparent authority to bind the **LLC**.
 - b. An **LLC** may be managed by managers elected by the members.
 - 1). The managers do not need to be members.
 - 2). Members have no actual or apparent authority to bind the **LLC** unless the member is also a manager.
 - 3). **LLC** managers have the same limited liability as **LLC** members.

5. **LLC** members have the following rights:
 - a. The right to profits, losses and other distributions:
 - 1). Operating agreement determines how profits, losses and distributions are made.
 - 2). If nothing is said profits, losses and distributions are typically made on the basis of contributions made by members (not equally as in a partnership).
 - b. Unless otherwise agreed, a member has the right to assign her interest in the **LLC**;
 - 1). The assignment doesn't dissolve the **LLC**.
 - 2). The assignee doesn't become a member of the **LLC**.
 - 3). The assignee only receives the right to receive assignor's share of distributions.

6. Dissolution of an **LLC**:
 - a. An **LLC** is dissolved in much the same manner as a partnership.
 - b. **e.g.** An **LLC** is automatically dissolved when a member ceases to be associated with the company (referred to as dissociation) by withdrawal, death, bankruptcy, etc.
 - c. In most states remaining members may continue the business by unanimous consent.

OTHER UNINCORPORATED ASSOCIATIONS

1. A **joint venture** is a business association of two or more owners acting together for profit for a limited purpose and for limited duration
 - a. joint ventures are usually for a single project whereas a partnership involves an ongoing business
 - b. joint ventures are treated as a partnership in most cases by the law

2. A **Limited Liability Partnership (LLP)** is a cross between a general partnership and a limited partnership and has been adopted in over 36 states
 - a. an **LLP** is treated by the law as a general partnership for almost all purposes (**e.g.** partners in an **LLP** are general partners, partners are jointly liable for partnership contract debts and an **LLP** is taxed as a partnership)
 - b. in an **LLP** partners have limited liability like a limited partner in one case only, for the negligence, wrongful acts or misconduct of other partners
 - 1). some states extend this limited liability to include acts of employees or agents
 - 2). two states (New York and Minnesota) limit a partner's liability to all obligations of the **LLP**
 - c. **exceptions:** in most states a partner is still liable for his/her own misconduct and the misconduct of those acting under the partner's direct management or control
 - d. as with a limited partnership, an **LLP** must file with the state and its name must clearly indicate it is a limited liability partnership (**i.e.** use **LLP** or **Limited Liability Partnership** after its name)

3. A **Business Trust** or **Massachusetts Trust** is a trust that has been established to operate a business for profit. It has three essential characteristics:
 - a. the trust estate is for the purpose of operating a business for profit.
 - b. each trust beneficiary receives a certificate evidencing ownership in the trust which is freely transferable.

- c. trustees have the right to manage the business free from the beneficiaries' control
 - 1). as long as the beneficiaries have no control over management of the business, they are not personally liable.
 - 2). if the trustees are elected or can be removed by the beneficiaries, the trust is treated as a partnership and the beneficiaries are personally liable.
- 4. An **unincorporated, nonprofit association** is an association of two or more parties for social or charitable purposes.
 - a. It is not a partnership because it is not done for profit.
 - b. Members are not personally liable for an undertaking unless they authorized or assented to it.

Chapter One: Non-Corporate Entities

Multiple Choice Questions

1. Which of the following requirements must be met to have a valid partnership exist?

- I. Co-ownership of all property used in a business.
 - II. Co-ownership of a business for profit.
- a. I only.
 - b. II only.
 - c. Both I and II.
 - d. Neither I nor II.

2. When parties intend to create a partnership that will be recognized under the Revised Uniform Partnership Act, they must agree to

	<i>Conduct a business for profit</i>	<i>Share gross receipts from a business</i>
a.	Yes	Yes
b.	Yes	No
c.	No	Yes
d.	No	No

3. Which of the following is **not** necessary to create an express partnership?

- a. Execution of a written partnership agreement.
- b. Agreement to share ownership of the partnership.
- c. Intention to conduct a business for profit.
- d. Intention to create a relationship recognized as a partnership.

4. Generally, under the Revised Uniform Partnership Act, a partnership has which of the following characteristics?

	<i>Unlimited duration</i>	<i>Obligation for payment of federal income tax</i>
a.	Yes	Yes
b.	Yes	No
c.	No	Yes
d.	No	No

5. Which of the following statements is correct concerning liability when a partner in a general partnership commits a tort while engaged in partnership business?

- a. The partner committing the tort is the only party liable.
- b. The partnership is the only party liable.
- c. Each partner is jointly and severally liable.
- d. Each partner is liable to pay an equal share of any judgment.

6. Under the Revised Uniform Partnership Act, which of the following statements concerning the powers and duties of partners in a general partnership is(are) correct?

- I. Each partner is an agent of every other partner and acts as both a principal and an agent in any business transaction within the scope of the partnership agreement.
 - II. Each partner is subject to joint liability on partnership debts and contracts.
- a. I only.
 - b. II only.
 - c. Both I and II.
 - d. Neither I nor II.

7. Locke and Vorst were general partners in a kitchen equipment business. On behalf of the partnership, Locke contracted to purchase 15 stoves from Gage. Unknown to Gage, Locke was not authorized by the partnership agreement to make such contracts. Vorst refused to allow the partnership to accept delivery of the stoves and Gage sought to enforce the contract. Gage will

- a. Lose, because Locke's action was **not** authorized by the partnership agreement.
- b. Lose, because Locke was **not** an agent of the partnership.
- c. Win, because Locke had express authority to bind the partnership.
- d. Win, because Locke had apparent authority to bind the partnership.

8. The apparent authority of a partner to bind the partnership in dealing with third parties
- Must be derived from the express powers and purposes contained in the partnership agreement.
 - Will be effectively limited by a formal resolution of the partners of which third parties are unaware.
 - May allow a partner to bind the partnership to representations made in connection with the sale of goods.
 - Would permit a partner to submit a claim against the partnership to arbitration.

9. Which of the following statements is(are) usually correct regarding general partners' liability?

- All partners are jointly and severally liable for partnership torts.
 - All general partners are liable only for those partnership obligations they actually authorized.
- I only.
 - II only.
 - Both I and II.
 - Neither I nor II.

10. Which of the following statements is correct regarding a limited partnership?

- The general partner must make a capital contribution.
- It can only be created pursuant to a statute providing for the formation of limited partnerships.
- It can be created with limited liability for all partners.
- At least one general partner must also be a limited partner.

11. Which of the following statements is correct with respect to a limited partnership?

- A limited partner may **not** be an unsecured creditor of the limited partnership.
- A general partner may **not** also be a limited partner at the same time.
- A general partner may be a secured creditor of the limited partnership.
- A limited partnership can be formed with limited liability for all partners.

12. Which of the following statements regarding a limited partner is(are) generally correct?

	<i>The limited partner is subject to personal liability for <u>partnership debts</u></i>	<i>The limited partner has the right to participate in the control of the <u>partnership</u></i>
a.	Yes	Yes
b.	Yes	No
c.	No	Yes
d.	No	No

13. In general, which of the following statements is correct with respect to a limited partnership?

- A limited partner has the right to obtain from the general partner(s) financial information and tax returns of the limited partnership.
- A limited partnership can be formed with limited liability for all partners.
- A limited partner may **not** also be a general partner at the same time.
- A limited partner may hire employees on behalf of the partnership.

14. In general, which of the following statements is correct with respect to a limited partnership?

- A limited partner will be personally liable for partnership debts incurred in the ordinary course of the partnership's business.
- A limited partner is unable to participate in the management of the partnership in the same manner as general partners and still retain limited liability.
- A limited partner's death or incompetency will cause the partnership to dissolve.
- A limited partner is an agent of the partnership and has the authority to bind the partnership to contracts.

15. Which of the following statements is correct concerning the similarities between a limited partnership and a corporation?

- a. Each is created under a statute and must file a copy of its certificate with the proper state authorities.
- b. All corporate stockholders and all partners in a limited partnership have limited liability.
- c. Both are recognized for federal income tax purposes as taxable entities.
- d. Both are allowed statutorily to have perpetual existence.

16. Cass is a general partner in Omega Company general partnership. Which of the following unauthorized acts by Cass will bind Omega?

- a. Submitting a claim against Omega to arbitration.
- b. Confessing a judgment against Omega.
- c. Selling Omega's goodwill.
- d. Leasing office space for Omega.

17. Which of the following statements is correct regarding the division of profits in a general partnership when the written partnership agreement only provides that losses be divided equally among the partners? Profits are to be divided

- a. Based on the partners' ratio of contribution to the partnership.
- b. Based on the partners' participation in day to day management.
- c. Equally among the partners.
- d. Proportionately among the partners.

18. The partnership agreement for Owen Associates, a general partnership, provided that profits be paid to the partners in the ratio of their financial contribution to the partnership. Moore contributed \$10,000, Noon contributed \$30,000, and Kale contributed \$50,000. For the year ended December 31, 1993, Owen had losses of \$180,000. What amount of the losses should be allocated to Kale?

- a. \$40,000
- b. \$60,000
- c. \$90,000
- d. \$100,000

Items 19 and 20 are based on the following:

Dowd, Elgar, Frost, and Grant formed a general partnership. Their written partnership agreement provided that the profits would be divided so that Dowd would receive 40%; Elgar, 30%; Frost 20%; and Grant, 10%. There was no provision for allocating losses. At the end of its first year, the partnership had losses of \$200,000. Before allocating losses, the partners' capital account balances were: Dowd, \$120,000; Elgar, \$100,000; Frost, \$75,000; and Grant, \$11,000. Grant refuses to make any further contributions to the partnership. Ignore the effects of federal partnership tax law.

19. What would be Grant's share of the partnership losses?

- a. \$9,000
- b. \$20,000
- c. \$39,000
- d. \$50,000

20. After losses were allocated to the partners' capital accounts and all liabilities were paid, the partnership's sole asset was \$106,000 in cash. How much would Elgar receive on dissolution of the partnership?

- a. \$37,000
- b. \$40,000
- c. \$47,500
- d. \$50,000

21. Which of the following statements best describes the effect of the assignment of an interest in a general partnership?

- a. The assignee becomes a partner.
- b. The assignee is responsible for a proportionate share of past and future partnership debts.
- c. The assignment automatically dissolves the partnership.
- d. The assignment transfers the assignor's interest in partnership profits and surplus.

22. Cobb, Inc., a partner in TLC Partnership, assigns its partnership interest to Bean, who is not made a partner. After the assignment, Bean asserts the rights to

- I. Participate in the management of TLC.
- II. Cobb's share of TLC's partnership profits.

Bean is correct as to which of these rights?

- a. I only.
- b. II only.
- c. I and II.
- d. Neither I nor II.

23. Unless the partnership agreement prohibits it, a partner in a general partnership may validly assign rights to

	<u>Partnership property</u>	<u>Partnership distributions</u>
a.	Yes	Yes
b.	Yes	No
c.	No	Yes
d.	No	No

24. The partners of College Assoc., a general partnership, decided to dissolve the partnership and agreed that none of the partners would continue to use the partnership name. Under the Revised Uniform Partnership Act, which of the following events will occur on dissolution of the partnership?

	<u>Each partner's existing liability would be discharged</u>	<u>Each partner's apparent authority would continue</u>
a.	Yes	Yes
b.	Yes	No
c.	No	Yes
d.	No	No

Items 25 through 27 are based on the following:

Downs, Frey, and Vick formed the DFV general partnership to act as manufacturers' representatives. The partners agreed Downs would receive 40% of any partnership profits and Frey and Vick would each receive 30% of such profits. It was also agreed that the partnership would not terminate for five years. After the fourth year, the partners agreed to terminate the partnership. At that time, the partners' capital accounts were as follows: Downs, \$20,000; Frey, \$15,000; and Vick, \$10,000. There also were undistributed losses of \$30,000.

25. Which of the following statements about the form of the DFV partnership agreement is correct?

- a. It must be in writing because the partnership was to last for longer than one year.
- b. It must be in writing because partnership profits would **not** be equally divided.
- c. It could be oral because the partners had explicitly agreed to do business together.
- d. It could be oral because the partnership did **not** deal in real estate.

26. Vick's share of the undistributed losses will be

- a. \$0
- b. \$1,000
- c. \$9,000
- d. \$10,000

27. If Frey died before the partnership terminated

- a. Downs and Vick, as a majority of the partners, would have been able to continue the partnership.
- b. The partnership would have continued until the five year term expired.
- c. The partnership would automatically dissolve.
- d. Downs and Vick would have Frey's interest in the partnership.

28. A joint venture is a(an)

- a. Association limited to no more than two persons in business for profit.
- b. Enterprise of numerous co-owners in a nonprofit undertaking.
- c. Corporate enterprise for a single undertaking of limited duration.
- d. Association of persons engaged as co-owners in a single undertaking for profit.

29. Unless otherwise provided in a general partnership agreement, which of the following statements is correct when a partner dies?

	<u>The deceased partner's executor would automatically become a partner</u>	<u>The deceased partner's estate would be free from any partnership liabilities</u>	<u>The partnership would be dissolved automatically</u>
a.	Yes	Yes	Yes
b.	Yes	No	No
c.	No	Yes	No
d.	No	No	No

30. Park and Graham entered into a written partnership agreement to operate a retail store. Their agreement was silent as to the duration of the partnership. Park wishes to dissolve the partnership. Which of the following statements is correct?

- a. Park may dissolve the partnership at any time.
- b. Unless Graham consents to a dissolution, Park must apply to a court and obtain a decree ordering the dissolution.
- c. Park may **not** dissolve the partnership unless Graham consents.
- d. Park may dissolve the partnership only after notice of the proposed dissolution is given to all partnership creditors.

31. Ted Fein, a partner in the ABC Partnership, wishes to withdraw from the partnership and sell his interest to Gold. All of the other partners in ABC have agreed to admit Gold as a partner and to hold Fein harmless for the past, present, and future liabilities of ABC. A provision in the original partnership agreement states that the partnership will continue upon the death or withdrawal of one or more of the partners. The agreement to hold Fein harmless for all past, present, and future liabilities of ABC will

- a. Prevent partnership creditors from holding Fein personally liable only as to those liabilities of ABC existing at the time of Fein's withdrawal.
- b. Prevent partnership creditors from holding Fein personally liable for the past, present, and future liabilities of ABC.
- c. Not affect the rights of partnership creditors to hold Fein personally liable for those liabilities of ABC existing at the time of his withdrawal.
- d. Permit Fein to recover from the other partners only amounts he has paid in excess of his proportionate share.

32. Lark, a partner in DSJ, a general partnership, wishes to withdraw from the partnership and sell Lark's interest to Ward. All of the other partners in DSJ have agreed to admit Ward as a partner and to hold Lark harmless for the past, present, and future liabilities of DSJ. As a result of Lark's withdrawal and Ward's admission to the partnership, Ward

- a. Acquired only the right to receive Ward's share of DSJ profits.
- b. Has the right to participate in DSJ's management.
- c. Is personally liable for partnership liabilities arising before and after being admitted as a partner.
- d. Must contribute cash or property to DSJ to be admitted with the same rights as the other partners.

33. Dill was properly admitted as a partner in the ABC Partnership after purchasing Ard's partnership interest. Ard immediately withdrew from the partnership. The partnership agreement states that the partnership will continue on the withdrawal or admission of a partner. Unless the partners otherwise agree,

- a. Dill's personal liability for partnership debts incurred before Dill was admitted will be limited to Dill's interest in partnership property.
- b. Ard will automatically be released from personal liability for partnership debts incurred before Dill's admission.
- c. Ard will be permitted to recover from the other partners the full amount that Ard has paid on account of partnership debts incurred before Dill's admission.
- d. Dill will be subjected to unlimited personal liability for partnership debts incurred before being admitted.

34. On dissolution of a general partnership, distributions will be made on account of:

- I. Partners' capital accounts
- II. Amounts owed partners with respect to profits
- III. Amounts owed partners for loans to the partnership

in the following order.

- a. III, I, II.
- b. I, II, III.
- c. II, III, I.
- d. III, II, I.

35. Long, Pine, and Rice originally contributed \$100,000, \$60,000, and \$20,000, respectively, to form the LPR Partnership. Profits and losses of LPR are to be distributed 1/2 to Long, 1/3 to Pine, and 1/6 to Rice. After operating for one year, LPR's total assets on its books are \$244,000, total liabilities to outside creditors are \$160,000 and total capital is \$84,000. The partners made no withdrawals. LPR has decided to liquidate. If all of the partners are solvent and the assets of LPR are sold for \$172,000

- a. Rice will personally have to contribute an additional \$8,000.
- b. Pine will personally have to contribute an additional \$4,000.
- c. Long, Pine, and Rice will receive \$6,000, \$4,000, and \$2,000, respectively, as a return of capital.
- d. Long and Pine will receive \$28,000 and \$4,000, respectively, and Rice will have to contribute an additional \$20,000.

36. Eller, Fort, and Owens do business as Venture Associates, a general partnership. Trent Corp. brought a breach of contract suit against Venture and Eller individually. Trent won the suit and filed a judgment against both Venture and Eller. Trent will generally be able to collect the judgment from

- a. Partnership assets only.
- b. The personal assets of Eller, Fort, and Owens only.
- c. Eller's personal assets only after partnership assets are exhausted.
- d. Eller's personal assets only.

Chapter One: Non-Corporate Entities

Other Objective Questions

NUMBER 1

Number 1 consists of 5 items. Select the best answer for each item. **Answer all items.** Your grade will be based on the total number of correct answers.

Items 1 through 5 are based on the following:

On March 1, 1995, Grove, Plane, and Range formed Techno Associates, a general partnership. They made capital contributions to the partnership as follows: Grove contributed \$125,000; Plane contributed \$250,000; and Range contributed \$500,000. They prepared and executed a written partnership agreement that provided that profits would be shared equally, that the partnership would last for five years, and that the partnership use a calendar year for accounting purposes. There was not provision as to how losses would be allocated not was there any provision regarding the continued use of the partnership name in the event of dissolution.

- On April 1, 1996, Range assigned Range's partnership interest to Blank. Blank notified Grove and Plane that Blank wanted to participate in the partnership business and vote on partnership issues.
- On June 10, 1996, a judgment was entered against Techno in a suit for breach of contract.
- On December 31, 1996, Grove resigned from the partnership.
- During the year-end closing, it was established that Techno had incurred an operating loss in 1996 as a result of the judgment. It was also established that Techno, being unable to pay its debts as they became due, was insolvent.
- On May 1, 1997, Techno filed for bankruptcy.

The Revised Uniform Partnership Act applies.

Required:

For **Items 1 through 3**, select the correct answer from **List I**. An answer may be selected once, more than once, or not at all.

1. What would be Range's liability for Techno's 1996 operating loss?
2. What would be Blank's liability for Techno's 1996 operating loss?
3. What would be Groves's liability for Techno's 1996 operating loss?

List I	
(A)	No personal liability.
(B)	Liability limited to the amount contributed to the partnership.
(C)	Liability limited to the amount in the capital account.
(D)	Full personal liability for up to one-third of the total amount of the partnership debt.
(E)	Full personal liability for up to the total amount of the partnership debt.

For **Item 4**, select the correct answer from **List II**.

4. As of January 1, 1997, who were the partners in Techno?

List II	
(A)	Blank and Plane.
(B)	Plane and Range.
(C)	Blank, Plane, and Grove.
(D)	Grove, Plane, and Range.
(E)	Blank, Grove, Plane, and Range.

For **Item 5**, select the correct answer from **List III**.

5. On May 1, 1997, what was the status of Techno?

List III	
(A)	Dissolved.
(B)	Liquidated.
(C)	Terminated.

NUMBER 2

Number 2 consists of 6 items. Select the best answer for each item. **Answer all items.** Your grade will be based on the total number of correct answers.

In 1992, Anchor, Chain, and Hook created ACH Associates, a general partnership. The partners orally agreed that they would work full time for the partnership and would distribute profits based on their capital contributions. Anchor contributed \$5,000; Chain \$10,000; and Hook \$15,000.

For the year ended December 31, 1993, ACH Associates had profits of \$60,000 that were distributed to the partners. During 1994, ACH Associates was operating at a loss. In September 1994, the partnership dissolved.

In October 1994, Hook contracted in writing with Ace Automobile Co. to purchase a car for the partnership. Hook had previously purchased cars from Ace Automobile Co. for use by ACH Associates partners. ACH Associates did not honor the contract with Ace Automobile Co. and Ace Automobile Co. sued the partnership and the individual partners.

Required:

Items 1 through 6 refer to the above facts. For each item, determine whether (A) or (B) is correct.

1.
 - A. The ACH Associates oral partnership agreement was valid.
 - B. The ACH Associates oral partnership agreement was invalid because the partnership lasted for more than one year.

2.
 - A. Anchor, Chain, and Hook jointly owning and conducting a business for profit establishes a partnership relationship.
 - B. Anchor, Chain, and Hook jointly owning income producing property establishes a partnership relationship.

3.
 - A. Anchor's share of ACH Associates' 1993 profits was \$20,000.
 - B. Hook's share of ACH Associates' 1993 profits was \$30,000.
4.
 - A. Anchor's capital account would be reduced by 1/3 of any 1994 losses.
 - B. Hook's capital account would be reduced by 1/2 of any 1994 losses.
5.
 - A. Ace Automobile Co. would lose a suit brought against ACH Associates because Hook, as a general partner, has no authority to bind the partnership.
 - B. Ace Automobile Co. would win a suit brought against ACH Associates because Hook's authority continues during dissolution.
6.
 - A. ACH Associates and Hook would be the only parties liable to pay any judgment recovered by Ace Automobile Co.
 - B. Anchor, Chain, and Hook would be jointly and severally liable to pay any judgment recovered by Ace Automobile Co.

NUMBER 3

Best Aviation Associates is a general partnership engaged in the business of buying, selling and servicing used airplanes. Best's original partners were Martin and Kent. They formed the partnership on January 1, 1992, under an oral partnership agreement which provided that the partners would share profits equally. There was no agreement as to how the partners would share losses. At the time the partnership was formed, Martin contributed \$320,000 and Kent contributed \$80,000.

On December 20, 1993, Kent assigned Kent's partnership interest in Best to Green. On December 31, 1993, Kent advised Martin of the assignment to Green. On January 11, 1994, Green contacted Martin and demanded to inspect the partnership books and to participate in the management of partnership affairs, including voting on partnership decisions.

On January 13, 1994, it was determined that Best had incurred an operating loss of \$160,000 in 1993. Martin demanded that Kent contribute \$80,000 to the partnership to account for Kent's share of the loss. Kent refused to contribute.

On January 28, 1994, Laco Supplies, Inc., a creditor of Best, sued Best and Martin for unpaid bills totaling \$92,000. Best had not paid the bills because of a cash shortfall caused by the 1993 operating loss.

Martin has taken the following positions:

- Green is not entitled to inspect the partnership books or participate in the management of the partnership.
- Only the partnership is liable for the amounts owed to Laco, or, in the alternative, Martin's personal liability is limited to 50% of the total of the unpaid bills.

Kent has taken the following positions:

- Only Martin is liable for the 1993 operating loss because of the assignment to Green of Kent's partnership interest.
- Any personal liability of the partners for the 1993 operating loss should be allocated between them on the basis of their original capital contributions.

Required:

- a. Determine whether Martin's positions are correct and state the reasons for your conclusions.
- b. Determine whether Kent's positions are correct and state the reasons for your conclusions.

NUMBER 4

Smith, Edwards, and Weil formed Sterling Properties Limited Partnership to engage in the business of buying, selling and managing real estate. Smith and Edwards were general partners. Weil was a limited partner entitled to 50% of all profits.

Within a few months of Sterling's formation, it became apparent to Weil that Smith and Edwards' inexperience was likely to result in financial disaster for the partnership. Therefore, Weil became more involved in day-to-day management decisions. Weil met with prospective buyers and sellers of properties; assisted in negotiating partnership loans with its various lenders; and took an active role in dealing with personnel problems. Things continued to deteriorate for Sterling, and the partners began blaming each other for the partnership's problems.

Finally, Smith could no longer deal with the situation, and withdrew from the partnership. Edwards reminded Smith that the Sterling partnership agreement specifically prohibited withdrawal by a general partner without the consent of all the other partners. Smith advised Edwards and Weil that she would take no part in any further partnership undertaking and would not be responsible for partnership debts incurred after this withdrawal.

With Sterling on the verge of collapse, the following situations have occurred:

- Weil demanded the right to inspect and copy the partnership's books and records and Edwards refused to allow Weil to do so, claiming that Weil's status as a limited partner precludes that right.
- Anchor Bank, which made a loan to the partnership prior to Smith's withdrawal, is suing Sterling and each partner individually, including Smith, because the loan is in default. Weil denied any liability based on his limited partner status. Smith denies liability based on her withdrawal.
- Edwards sued Smith for withdrawing from the partnership and is uncertain about the effect of her withdrawal on the partnership.
- Weil wants to assign his partnership interest to Fred Alberts, who wants to become a substitute limited partner. Weil is uncertain about his right to assign this interest to Alberts and, further, the right of Alberts to become a substitute limited partner. Edwards contends that Edwards' consent is necessary for the assignment or the substitution of Alberts as a limited partner and that without this consent any such assignment would cause a dissolution of the partnership. The Sterling partnership agreement and certificate are silent in this regard.

Required:

Answer the following questions, setting forth reasons for the conclusions stated.

- a. Is Weil entitled to inspect and copy the books and records of the partnership?
- b. Are Weil and/or Smith liable to Anchor Bank?
- c. Will Edwards prevail in the lawsuit against Smith for withdrawing from the partnership?
- d. What is the legal implication to the partnership of Smith's withdrawal?
- e. Can Weil assign his partnership interest to Alberts?
- f. Can Edwards prevent the assignment to Alberts or the substitution of Alberts as a limited partner?
- g. What rights does Alberts have as assignee of Weil's partnership interest?
- h. What effect does an assignment have on the partnership?

NUMBER 5

Prime Cars Partnership is a general partnership engaged in the business of buying, selling, and servicing used cars. Prime's original partners were Baker and Mathews, who formed the partnership three years ago under a written partnership agreement, which provided that:

- Profits and losses would be allocated 60% to Baker and 40% to Mathews.
- Baker would be responsible for supervising Prime's salespeople and for purchasing used cars for inventory. Baker could not, without Mathews' consent, enter into a contract to purchase more than \$15,000 worth of used cars at any one time.
- Mathews would be responsible for supervising Prime's service department.

On May 1, 1990, Baker entered into a contract on Prime's behalf with Jaco Auto Wholesalers, Inc. to purchase 11 used cars from Jaco for a total purchase price of \$40,000. Baker's agreement with Jaco provided that the cars would be delivered to Prime on September 1. Baker did not advise Mathews of the terms and conditions of the contract with Jaco. Baker had regularly done business with Jaco on behalf of Prime in the past, and on several occasions had purchased \$12,000 to \$15,000 of used cars from Jaco. Jaco was unaware of the limitation on Baker's authority.

Baker also frequently purchased used cars for Prime from Top Auto Auctions, Ltd., a corporation owned by Baker's friend. Whenever Prime purchased cars from Top, Baker would personally receive up to 5% of the total purchase price from Top as an incentive to do more business with Top. Baker did not tell Mathews about these payments.

On August 1, 1990, Baker and Mathews agreed to admit KYA Auto Restorers, Inc. as a partner in Prime to start up and supervise a body shop facility. KYA made a \$25,000 capital contribution and Prime's partnership agreement was amended to provide that Prime's profits and losses would be shared equally by the partners.

On September 1, 1990, Mathews learned of the Jaco contract and refused to accept delivery of the cars. Mathews advised Jaco that Baker had entered into the contract without Mathews' consent as required by their agreement. Jaco has demanded a payment of \$10,000 from Prime for Jaco's lost profits under the contract.

Mathews has also learned about the incentive payments made to Baker by Top.

Mathews has taken the following positions:

- Prime is not liable to Jaco because Baker entered into the contract without Mathews' consent.
- In any event, Mathews is not liable to Jaco for more than 40% of Jaco's lost profits because of the original partnership provisions concerning the sharing of profits and losses.
- Baker is liable to Mathews for any liability incurred by Mathews under the Jaco contract.
- Baker is liable to Prime for accepting the incentive payments from Top.

KYA contends that none of its \$25,000 capital contribution should be applied to the Jaco liability and that, in any event, KYA does not have any responsibility for the obligation.

Required:

- a. State whether Mathews' positions are correct and give the reasons for your conclusions.
- b. State whether KYA's contentions are correct and give the reasons for your conclusions.

Chapter One: Non-Corporate Entities

Multiple Choice Answers

1. **(b) A partnership is an association of two or more co-owners of a business for profit.** Thus, (II) is a requirement of a partnership. It is not necessary that each piece of property used in the business be co-owned by all the partners. For example, the partnership may lease equipment from a third party or may use property that is owned by one partner and not others. Thus (I) is not a requirement of a partnership.
2. **(b) A partnership is an association of two or more co-owners of a business for profit.** Thus, to create a partnership, the parties must intend to conduct a **business for profit**. It is not necessary to share gross receipts from a business to form a partnership. Indeed, **partners share net receipts, not gross receipts**.
3. **(a) A partnership is not one of the six types of contracts that require a writing under the statute of frauds (GRIFE + marriage).** Only a partnership impossible to perform in one year and a limited partnership would require a writing. Answers (b), (c) and (d) are incorrect because co-ownership of a business for profit and with the intent to create a partnership are all necessary requirements to create an express partnership.
4. **(d) A partnership is not usually considered to be a separate legal entity. Specifically, a partnership does not pay federal income tax. A partnership does not have perpetual existence** like a corporation. Only answer (d) states no unlimited duration for a partnership and no obligation to pay federal income tax.
5. **(c) Partners are agents of the partnership and each other. Thus, agency rules apply. If a partner commits a tort while acting in the scope of partnership business, the partner would be liable, the partnership would be liable and all other partners would be liable (respondeat superior). Partners are joint and severally liable for all partnership torts.** Answers (a) and (b) are incorrect because the partner committing the tort, the partnership and all other partners would be liable. Answer (d) is incorrect because each partner would be personally liable for the whole amount of any judgment, not just an equal share.
6. **(c) Statement I is correct because partners are agents of the partnership and agents of each other.** Since partners are co-owners of the business, when a partner acts on behalf of the business the partner is acting as both a principal and as an agent. Statement II is correct **partners are jointly liable on all partnership debts and contract obligations**. This means all partners must be sued as a group.
7. **(d) Partners are agents of the partnership and each other. Thus, a partner can bind the partnership and fellow partners to a contract if the partner had actual authority or apparent authority.** Although Locke exceeded Locke's actual authority, the partnership will still be liable based on Locke's apparent authority. Apparent authority depends on how things appear to third parties. It was reasonable for Gage to believe that a partner, like Locke, could purchase 15 stoves for the business. Since it appeared to Gage that Locke was authorized, Gage will win based on apparent authority. Thus (d) is correct and (a) is incorrect. Answer (b) is incorrect because Locke was an agent of the partnership. Answer (c) is incorrect because Locke did not have express authority. The partnership agreement expressly stated Locke was not authorized to make such contracts.
8. **(c) Partners are agents of the partnership and each other. A partner acting with real or apparent authority can impose contract liability on the partnership and on their fellow partners.** Thus, a partner selling goods with either real or apparent authority would bind the partnership. Answer (a) is incorrect because apparent authority depends on how things appear to third parties, not on the express provisions of the partnership agreement. Answer (b) is incorrect because if a partner's authority was expressly limited by a resolution and the third party was unaware of the resolution, it may still appear that the partner was authorized. In such a case, apparent authority would exist. Answer (d) is incorrect because partnership law requires unanimous consent of all partners to submit a claim to arbitration.

9. **(a)** Statement I is correct because **partners are jointly and severally liable for all partnership torts**. This is because partners are agents of the partnership and each other. If a partner commits a tort while acting in the scope of the agency, the principal is liable. Statement II is incorrect because **general partners are jointly liable for all partnership debts and contract obligations whether they actually authorized them or not**. Additionally, partners are agents of the partnership and each other and therefore can be liable for actions sanctioned not only by actual authority, but also by apparent authority.

10. **(b)** **To form a limited partnership in a state, there must be a special state statute that permits limited partnerships**. The limited partnership must file a certificate of limited partnership with the state. Answer (a) is incorrect because a general partner is not required to make a capital contribution. Answer (c) is incorrect because a limited partnership must have at least one general partner and general partners are personally liable for all partnership debts. Answer (d) is incorrect because although a general partner may also be a limited partner in the same partnership at the same time, a general partner is not required to also be a limited partner.

11. **(c)** **Both general and limited partners may be creditors of a limited partnership**. A general partner may be either a secured or an unsecured creditor and so may a limited partner. Thus, (c) is correct and (a) is incorrect. Answer (b) is incorrect because a general partner may also be a limited partner in the same partnership at the same time. Answer (d) is incorrect because a limited partnership must have at least one general partner and general partners are personally liable for all partnership debts.

12. **(d)** **Limited partners have no personal liability beyond their investment**, thus they are not personally liable. **Limited partners may not take part in the control of the partnership**. If they do, they are liable like general partners to anyone reasonably believing they were a general partner. The only answer that reflects that they are not personally liable and may not take part in control of the partnership is (d).

13. **(a)** The law gives to all investors the right to inspect books and records at reasonable times. Stockholders, general partners and limited partners all have this right. Thus, **a limited partner may obtain financial information to include tax returns**. Answer (b) is incorrect because a limited partnership must have at least one general partner and general partners are personally liable for all partnership debts. Answer (c) is incorrect because a limited partner may also be a general partner in the same partnership at the same time. Answer (d) is incorrect because a limited partner may not take part in the control of the partnership.

14. **(b)** **Limited partners may not take part in the control of the partnership**. If they do, they are liable like general partners to anyone reasonably believing they were a general partner. Thus, a limited partner may not participate in the management of the partnership in the same manner as general partners without losing their limited liability. Answer (a) is incorrect because limited partners are not personally liable for partnership debts. Answer (c) is incorrect because changes in limited partners do not dissolve the partnership. Only changes in general partners cause the dissolution of the partnership. Answer (d) is incorrect because limited partners are not agents of the partnership, only general partners are agents of the partnership.

15. **(a)** **Both a limited partnership and a corporation are created pursuant to state statutes and both must file with the secretary of state**. Answer (b) is incorrect because a general partner in a limited partnership is personally liable for partnership debts. Equally, corporate law permits piercing of the corporate veil and holding stockholders personally liable in certain situations. Answer (c) is incorrect because a limited partnership is not recognized as a taxable entity for federal income tax purposes. Answer (d) is incorrect because only a corporation has perpetual existence.

16. **(d)** Answers (a), (b) and (c) are incorrect because **it takes unanimous consent of all partners to submit a claim to arbitration, to confess a judgment (admit liability in a law suit) and to sell the partnership's goodwill**. Answer (d) is correct because leasing office space for the partnership by a partner would be within the partner's apparent authority. Since it would be reasonable to believe that a partner could lease space, the partnership would be bound.

17. **(c)** **Each partner has an equal right to share in profits and losses, unless otherwise agreed**. Thus, profits are to be divided equally among the partners when the agreement is silent on the matter. Answers (a), (b) and (d) are incorrect because profits are not divided based on capital contributions, on management participation or proportionally. Profits are divided equally.

18. **(d) If a division of profits is specified** in a partnership agreement, **but not a division of losses, losses will be divided in the same manner as profits.** The partnership agreement for Owen specified that profits were to split according to capital contributions (Moore - \$10,000, Noon - \$30,000 and Kale - \$50,000). Therefore, losses must be split the same way. With losses of \$180,000, Kale's share of the loss would be \$100,000 (5/9 of \$180,000) and only (d) reflects this amount.

19. **(b) If a division of profits is specified** in a partnership agreement, **but not a division of losses, losses will be divided in the same manner as profits.** This partnership agreement specified that profits were to be split Dowd - 40%, Elgar - 30%, Frost - 20% and Grant - 10%. Therefore losses must be split the same way. With losses of \$200,000 and Grant's share being 10%, Grant's share of the losses would be \$20,000. Only answer (b) reflects this amount.

20. **(a) The order of distribution upon dissolution is to pay creditors, then pay back loans made by the partners, then pay back capital contributions.** All liabilities have been paid and there were not any loans made by the partners. The next order of distribution is to pay back capital contributions. The partners share of losses was allocated to their capital accounts. Dowd contributed \$120,000 and had a 40% share of the \$200,000 loss (\$80,000). Thus, Dowd is due \$40,000 (\$120,000 minus \$80,000). Elgar contributed \$100,000 and had a 30% share of a \$200,000 loss (\$60,000). Thus, Elgar is due \$40,000 (\$100,000 minus \$60,000). Frost contributed \$75,000 and had a 20% share of a \$200,000 loss (\$40,000). Thus, Frost is due \$35,000 (\$75,000 minus \$40,000). Grant contributed \$11,000 and had a 10% share of a \$200,000 loss (\$20,000). Thus, Grant should contribute \$9,000 because of the negative balance (\$11,000 minus \$20,000). Grant has refused to contribute the \$9,000, thus each partner must proportionately share in this shortfall. Dowd's proportionate share is 4/9 of \$9,000 (\$4,000), Elgar's is 1/3 of \$9,000 (\$3,000) and Frost's is 2/9 of \$9,000 (\$2,000) Final payment would be Dowd \$36,000 (\$40,000 minus \$4,000), Elgar \$37,000 (\$40,000 minus \$3,000) and Frost \$33,000 (\$35,000 minus \$2,000) equaling the \$106,000 available. The only answer that reflects that Elgar receives \$37,000 is (a).

21. **(d) An assignment** of a general partnership interest **confers on the assignee only the right to receive the assignor's share of profits**, if any. Answer (a) is incorrect because the assignee does not become a partner without the consent of all other partners. Answer (b) is incorrect because the assignor is still liable for debts and the assignee is not liable. Answer (c) is incorrect because an assignment does not dissolve the partnership.

22. **(b) An assignee** of a partner's interest in a partnership **does not become a substitute partner.** The **assignee receives no rights other than the right to receive the assignor's share of profits, if any.** Thus, Bean received the right to Cobb's share of profits, but did not receive the right to participate in the management of the partnership. Only answer (b) reflects the right to profits, but not the right to participate in management.

23. **(c) A partner may validly assign the right to receive partnership distributions.** The assignee would only receive the right to receive the assignor's share of profits, if any. **A partner may not validly assign rights to specific partnership property** because it takes unanimous consent of all partners to transfer partnership property to others. Only answer (c) reflects the right to assign distributions, but not the right to assign partnership property.

24. **(c) Partners** are agents of the partnership and each other. Thus, agency rules apply. If a partnership dissolves, partners must give actual notice to old customers and published notice to new ones. Failure of a partner to give proper notice would give a partner apparent authority to act on behalf of the partnership with customers who were unaware of the dissolution. **Although dissolution would discharge a partner's actual authority, it does not discharge a partner's apparent authority.** Only answer (c) reflects that a partner's liability is not automatically discharged by dissolution and that apparent authority would continue.

25. **(a) A partnership impossible to complete in one year would require a writing under the statute of frauds.** The partners agreed the partnership was not to be terminated for five years and thus, a writing was required. Answer (b) is incorrect because how profits are to be divided has no bearing on whether a writing is required. Answers (c) and (d) are incorrect because a writing was required for this partnership and thus, the partnership could not be oral.

26. **(c) If a division of profits is specified** in a partnership agreement, **but not a division of losses, losses will be divided in the same manner as profits.** This partnership agreement specified that profits were to be split Downs - 40%, Frey

and Vick - 30% each. Therefore, losses will be split the same way. Vick has a 30% share of a \$30,000 loss or \$9,000. Only answer (c) reflects this amount.

27. **(a)** Under RUP, if a majority of the partners agree to continue the partnership, they may do so and the partnership is not dissolved. Answer (b) is incorrect because the partnership agreement merely states that the partnership will not end for five years, inferring that it may go beyond five years. Answer (c) is incorrect because one of the significant changes under RUPA is that a partnership is an entity in itself and the departure of a partner does not **automatically** dissolve the partnership. In a two-person partnership, the departure of one partner would dissolve the partnership, since a partnership must have two persons. Answer (d) is incorrect because Frey's interest becomes part of his estate; however, the estate cannot become a partner without the consent of **all** the other partners, which is unlikely. The estate's interest is similar to that of an assignee.

28. **(d) Joint ventures are a business association of two or more co-owners acting together for profit for a limited purpose and for a limited duration.** They are usually for a single undertaking. Joint ventures are treated as a partnership in most cases by the law. Answer (a) is incorrect because a joint venture may have more than two persons. Answer (b) is incorrect because the co-owners must act together for profit. Answer (c) is incorrect because a joint venture is not a corporate enterprise.

29. **(d)** A partner's estate does not become a partner unless agreed to by all the other partners. The estate is responsible for all partnership liabilities up until the partner's death. The partnership would not automatically dissolve if a majority of the remaining partners agree to continue.

30. **(a)** Park may dissolve the partnership at any time. Since there are only two partners, the departure of Park leaves only one partner. A partnership requires two partners operating a business for profit.

31. **(c) A partner is personally liable for all partnership debts that occurred while he was a partner.** Fein was a member of the ABC partnership and was personally liable for all debts of ABC that occurred while he was a partner. The agreement to hold Fein harmless was made by the other partners and not by the creditors. The agreement to hold Fein harmless does not relieve Fein from liability to creditors, it merely gives Fein the right to recover any amounts he may have to pay to the creditors from the other partners. Answers (a) and (b) are incorrect because the creditors are not prevented from holding Fein liable for debts that occurred while Fein was a partner. Answer (d) is incorrect because the hold harmless agreement allows Fein to recover from the other partners all amounts he may have to pay to creditors, not just the amount in excess of his proportionate share.

32. **(b) Everything in a partnership is equal unless otherwise agreed. This includes the right to participate in management.** Since the partners agreed to admit Ward as a partner, Ward has the right to participate in management. Answer (a) is incorrect because Ward has an equal right in all partnership matters unless the partners specifically agree otherwise. An assignee acquires only the right to receive their assignor's share of profits. Ward was more than an assignee, Ward was a partner. Answer (c) is incorrect because Ward is only personally liable for partnership debts that occur after (s)he is admitted as a partner. Ward would not be personally liable for debts that occurred prior to becoming a partner. Answer (d) is incorrect because a partner is not required to contribute cash or property to become a partner. They may contribute services or they may not contribute anything.

33. **(a) An incoming partner is not personally liable for partnership debts occurring prior to becoming a partner.** However, an **incoming partner's interest in partnership property can be attached by creditors.** Thus, the liability of Dill (the incoming partner) would be limited to Dill's interest in partnership property. Answer (b) is incorrect because a departing partner is personally liable for all partnership debts that occurred while (s)he was a partner. Answer (c) is incorrect because Ard cannot recover from the other partners the full amount that Ard paid creditors unless the other partners specifically agreed to hold Ard harmless. There was no hold harmless agreement given to Ard. Answer (d) is incorrect because Dill is only personally liable for partnership debts that occur after (s)he is admitted as a partner. Dill would not be personally liable for debts that occurred prior to becoming a partner.

34. **(a)** Upon **dissolution of a general partnership** the following **order of distribution** occurs: **first creditors are paid, second partners are repaid for any loans or advances made to the partnership, third capital contributions are paid and lastly profits are split.** Only answer (a) reflects this order of distribution.

35. (a) Upon **dissolution of a general partnership** the following **order of distribution** occurs: **first creditors are paid, second partners are repaid for any loans or advances made to the partnership, third capital contributions are paid and lastly profits are split.** Creditors are owed \$160,000, there are no loans made by partners and a total of \$180,000 is due for capital contributions (Long - \$100,000, Pine - \$60,000 and Rice- \$20,000). Thus, \$340,000 is needed to pay creditors and capital contributions (\$180,000 + \$160,000). Of the \$340,000 needed, only \$172,000 is available from the sale of assets. This leaves a shortfall of \$168,000 (\$340,000 minus \$172,000 = \$168,000). Long's share of the shortfall is 1/2 of \$168,000 or \$84,000. Thus, Long will receive his capital contribution (\$100,000) minus his share of the shortfall (\$84,000), or \$16,000. Pine's share of the shortfall is 1/3 of \$168,000 or \$56,000. Thus Pine will receive his capital contribution (\$60,000) minus his share of the shortfall (\$56,000), or \$4,000. Rice's share of the shortfall is 1/6 of \$168,000 or \$28,000. Rice will receive his capital contribution (\$20,000) minus his share of the shortfall (\$28,000) leaving a negative balance of \$8,000. Thus, Rice will have to contribute an additional \$8,000. The only answer that reflects this distribution is (a).

36. (c) **Partnership creditors can only go after a partner personally after all partnership assets are first exhausted.** Thus, Trent can only go after the personal assets of Eller after the partnership assets are exhausted. Answer (a) and (b) are incorrect because a creditor can collect a judgment from both partnership assets and from partners personally. Answer (d) is incorrect because partnership creditors must first exhaust partnership assets before they can go after a partner personally.

Chapter One: Non-Corporate Entities

Other Objective Answers

ANSWER 1

1. (E) Partners in a general partnership have unlimited personal liability to 3rd parties for all partnership debts, contract obligations and torts. Although Range assigned Range's interest to Blank on April 1, Range (the assignor) remained a general partner and remained liable for partnership debt. Since Range was a general partner, Range has full or unlimited liability for the total amount of the partnership debt. Answer (A) is incorrect because Range is liable. Answers (B) and (C) are incorrect because Range's liability is not limited. It is unlimited. Answer (D) is incorrect because Range has liability for all of the debt **as to 3rd parties**, not just 1/3. **Between the partners** (Range, Grove and Plane), Range's liability would be for 1/3 of the debt, but not as to 3rd parties.
2. (A) Blank has no personal liability for the 1996 operating loss because Blank was not a partner. On April 1, Range assigned Range's interest to Blank. Blank (the assignee) cannot become a partner without the consent of Grove and Plane. Blank only acquired the right to receive Range's share of profits and is not liable for Range's share of losses. Answers (B), (C) (D) and (E) are incorrect because they state Blank has liability.
3. (E) Partners in a general partnership have unlimited personal liability to 3rd parties for all partnership debts, contract obligations and torts. Since Grove was a general partner, Grove has full or unlimited liability for the total amount of the partnership debt. Answer (A) is incorrect because Grove is liable. Answers (B) and (C) are incorrect because Grove's liability is not limited. It is unlimited. Answer (D) is incorrect because Grove has liability for all of the debt **as to 3rd parties**, not just 1/3. **Between the partners** (Range, Grove and Plane), Grove's liability would be for 1/3 of the debt, but **not as to 3rd parties**.
4. (B) On January 1, 1997, Plane and Range were the partners of Techno. Grove was not a partner because Grove resigned on December 31, 1996. Blank was not a partner because an assignee cannot become a partner without the consent of the remaining partners. Range remained a partner because an assignment does not dissolve the partnership and the assignor (Range) remains a partner. Plane had not resigned, so Plane was also a partner.
5. (A) On May 1, 1997, Techno was dissolved. Bankruptcy of the partnership will automatically dissolve the partnership by operation of law. Answer (B) is incorrect because Techno was not liquidated on May 1. Liquidation or winding up occurs when there is a final settlement of all partnership affairs (e.g. complete unfinished business, collection of receivables, payment of creditors and distribution of assets). On May 1, none of that had occurred. Answer (C) is incorrect because termination occurs upon the completion of liquidation or winding up. Since Techno had not yet been liquidated, Techno could not have been terminated.

ANSWER 2

1. (A) A partnership is not one of the six types of contracts that require a writing under the statute of frauds (**GRIFE + marriage**). Only a partnership impossible to perform in one year would require a writing. This partnership did last for more than one year, but it could have been dissolved before the year was up. Thus, it was not impossible to perform in one year and the partnership agreement may be oral, making (A) correct and (B) incorrect.
2. (A) A partnership is two or more co-owners of a business for profit. Answer (B) is incorrect because the mere joint ownership of income producing property does not necessarily establish a partnership. A non-profit association, for example, can have joint ownership of income producing property, but it would not be a business conducted for profit.
3. (B) It was agreed that profits would be split based on capital contributions. Anchor contributed \$5,000 (1/6), Chain contributed \$10,000 (1/3) and Hook contributed \$15,000 (1/2). With profits of \$60,000, the distribution would be Anchor - \$10,000 (1/6 of \$60,000), Chain - \$20,000 (1/3 of \$60,000) and Hook - \$30,000 (1/2 of \$60,000). Thus, (B) is correct and (A) is incorrect.

4. (B) If a division of profits is specified in a partnership agreement, but not a division of losses, losses will be divided in the same manner as profits. This partnership agreement specified that profits were to be split based on capital contributions. Anchor contributed \$5,000 (1/6), Chain contributed \$10,000 (1/3) and Hook contributed \$15,000 (1/2). Thus, any losses would be allocated 1/6 to Anchor, 1/3 to Chain and 1/2 to Hook. Only answer (B) reflects this allocation.

5. (B) Partners are agents of the partnership and each other. Thus, agency rules apply. If a partnership dissolves, partners must give actual notice to old customers and published notice to new ones. Failure of a partner to give proper notice would give a partner apparent authority to act on behalf of the partnership with customers who were unaware of the dissolution. Although dissolution would discharge a partner's actual authority, it does not discharge a partner's apparent authority. Ace was an old customer, having previously sold cars to Hook for the partnership. Ace did not receive any notice of the dissolution. Thus Hook had apparent authority to bind the partnership to a contract with Ace even though dissolution had previously occurred, making (B) correct and (A) incorrect.

6. (B) Each partner is personally liable for all partnership debts. Thus, Anchor, Chain and Hook are jointly and severally liable to pay any judgment recovered by Ace. Answer (A) is incorrect because Anchor and Chain individually would also be liable for the judgment.

ANSWER 3

a. Martin's first position that Green is not entitled to inspect the partnership books or participate in partnership management is correct. Green, as an assignee of Kent's partnership interest, is entitled to receive Kent's share of partnership profits only. Green is not entitled, as an assignee of Kent's partnership interest, to inspect the partnership records or to participate in the management of the partnership.

Martin's second position that only the partnership is responsible for the debt owed Laco is incorrect. Although the partnership is primarily liable for the unpaid bills, both Martin and Kent, as Best's partners, are personally liable for the unpaid amount of the debt. Laco will be entitled to seek recovery against Martin or Kent for the full amount owed.

b. Kent's first position that only Martin is liable for the 1993 operating loss because of the assignment of Kent's partnership interest to Green is incorrect. A partner's assignment of a partnership interest does not terminate that partner's liability for the partnership's losses and debts.

Kent's second position that any personal liability of the partners for the 1993 operating loss should be allocated on the basis of their original capital contributions is incorrect. The 1993 loss will be allocated in the same way that profits were to be allocated between the parties, that is, equally, because Martin and Kent had not agreed on the method for allocating losses between themselves.

ANSWER 4

a. Weil is entitled to inspect and copy Sterling's books and records. A limited partner such as Weil has the right to have the partnership books kept at the principal place of business of the partnership and to inspect and copy them at all times.

b. Generally, limited partners are not liable to partnership creditors except to the extent of their capital contribution. In Weil's case, however, he will probably be liable to Anchor Bank in the same manner as Sterling's general partners because he has taken part in the control of the business of the partnership and, therefore, has lost his limited liability. Smith, as a general partner, would also be personally liable to Anchor because liability was incurred prior to withdrawal.

c. Edwards will likely prevail in his lawsuit against Smith for withdrawing because the partnership agreement specifically prohibits a withdrawal by a general partner without the consent of the other partners. Therefore, Smith has breached the partnership agreement and will be liable to Edwards for any damages resulting from Smith's withdrawal.

- d. The withdrawal (retirement) of a general partner disables the partnership unless the remaining general partners continue the business of the partnership under a right to do so provided in the limited partnership certificate, or unless all partners consent.
- e. Weil is free to assign his limited partnership interests to Alberts in the absence of any prohibitions in the Sterling partnership agreement or certificate.
- f. Alberts, however, cannot be a substitute limited partner without the consent of the remaining general partner, Edwards.
- g. Therefore, Alberts, as an assignee of Weil's limited partnership interest, may not exercise any rights of a partner. Alberts is entitled only to any distributions from Sterling to which Weil would have been entitled.
- h. Finally, the assignment by Weil of his partnership interest does not cause a dissolution of the partnership.

ANSWER 5

- a.
 1. Mathews' first position is incorrect. A partner is considered an agent of the partnership in carrying out its usual business. In this case, Baker lacked actual authority to bind Prime to the Jaco contract; however, Baker did have, from Jaco's perspective, apparent authority to do so because of the general character of Prime's business and, more important, because Baker had previously purchased cars from Jaco on Prime's behalf. Jaco was not bound by the limitation on Baker's authority unless Jaco was aware of it.
 2. Mathews' second position is also incorrect. As a general rule, a partner is liable for the debts of the partnership, and a third party is not bound by the profit and loss sharing agreements between partners because the third party is not a party to the partnership agreement. Therefore, Jaco can look to Prime's assets and Mathews' personal assets to satisfy the obligation.
 3. Mathews' third position is correct. A partner is liable to other partners for any liability associated with contracts entered into ostensibly on behalf of the partnership but outside the partner's actual authority. In this case, because Baker violated the agreement with Mathews concerning the \$15,000 limitation on used car purchases, Baker will be liable to Mathews for any liability that Mathews may have to Jaco.
 4. Mathews' fourth position is also correct. A partner owes a fiduciary duty (that is, a duty of loyalty) to the partnership and every other partner. A partner may not benefit directly or indirectly at the expense of the partnership. A partner must account to the partnership for any benefits derived from the partnership's business without the consent or knowledge of the other partners. In this case, Baker was not entitled to accept and retain the incentive payments made by Top. Doing so violated Baker's fiduciary duty to Prime and Mathews. Baker must account to Prime for all the incentive payments received.
- b. KYA's contention that its \$25,000 capital contribution cannot be used to satisfy Prime's obligation to Jaco is incorrect. A new partner is liable for partnership liabilities that arose prior to the new partner's admission, but the liability is limited to the partner's capital contribution and interest in partnership property. Therefore, KYA's liability is limited to its capital contribution and its interest as a partner in Prime's assets.

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Corporations – Subchapter C

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Chapter Two

Corporations – Subchapter C

FORMATION

1. Corporations are formed by **promoters**
 - a. promoters owe a fiduciary duty to subscribers, future stockholders and the corporation
 - b. promoters are not agents of the corporation because the corporation has not yet been formed (you cannot be an agent for a principal that doesn't yet exist)
2. Pre-incorporation contracts (made by promoters for the corporation to be formed)
 - a. promoters are primarily liable for pre-incorporation contracts made on behalf of the corporation and they remain primarily liable for these contracts
 - 1). promoters are not primarily liable if there is a **novation** (e.g. the corporation assumes the promoter's contract and the creditor releases the promoter)
 - 2). promoters are not primarily liable if the contract expressly negates liability (e.g. the contract states only the corporation will be liable upon adoption)
 - b. the corporation is only liable for pre-incorporation contracts when it adopts the contract or knowingly accepts the benefits of the contract
 - 1). once the corporation adopts the contract, both the corporation and the promoter are liable, unless there is a novation
 - 2). the corporation cannot ratify a promoter's pre-incorporation contract because the promoter is not an agent of the corporation
3. Corporations are formed in compliance with a state's incorporation statute by filing a copy of the articles of incorporation with the Secretary of State
 - a. the articles of incorporation **must contain**:
 - 1). provisions as to **stock** including the amount of authorized shares, the par value of stock and the classes of stock (i.e. which stock has voting rights)
 - 2). **names**: to include the name of the corporation, the registered agent and the names and addresses of all incorporators (those signing the articles of incorporation)
 - 3). **address** of corporation's initial registered office and address of all incorporators
 - b. amending the articles of incorporation requires passage of a resolution by a majority of the board of directors and approval by a majority of the stockholders
4. Promptly after incorporation, the corporation must hold an **organizational meeting** to adopt the corporate bylaws, appoint officers and transact other necessary business
 - a. the bylaws govern the internal management of the corporation
 - b. bylaws may be adopted by either the incorporators or the board of directors
 - c. the bylaws do not have to be filed with the state and are not part of the articles of incorporation
5. If a corporation is defectively formed, one of the following may apply:
 - a. it is a **de jure corporation** if it has **substantially complied** with the state's incorporation statute and its validity cannot be challenged even by the state
 - b. it is a **de facto corporation** if it has **not substantially complied** with the state's incorporation statute, but made a good faith attempt to do so and exercised corporate power in the belief a corporation was formed
 - 1). its validity can only be challenged by the state
 - 2). neither 3rd parties nor the corporation itself may attack its validity
 - c. most states simply provide that filing of the articles is conclusive proof of corporate existence
 - 1). its validity can only be challenged by the state
 - 2). only those acting as or on behalf of a corporation who knew there was no incorporation are liable

ATTRIBUTES OF CORPORATIONS

1. The chief attributes and advantages of a corporation are:
 - a. it is a **separate legal entity** apart from shareholders (e.g. it may sue and be sued, make contracts and its property belongs to the corporation not shareholders)
 - b. **limited liability** for shareholders (i.e. usually no liability beyond their investment)
 - c. shares of a corporation are **freely transferable**, unless restricted by contract
note: if restricted, the restrictions on transfer must be stated on the stock certificate
 - d. a corporation has **perpetual existence** (e.g. death or withdrawal of a stockholder or a director will not terminate a corporation)
 - e. it has **centralized management**
 - 1). stockholders elect the board of directors who are responsible for overall management of the corporation (e.g. they adopt the bylaws)
 - 2). the board of directors appoints officers who run the day-to-day affairs
 - 3). stockholders have no right to manage unless they are officers or directors
2. Disadvantages of the corporate form
 - a. corporations have a greater degree of **governmental supervision**
 - b. corporations may have a **tax disadvantage** (e.g. the corporation itself is taxed and the profits that are distributed to the stockholders are taxed again)
 - c. the **costs of incorporating and operating** the corporation may be greater
3. Different types of corporations
 - a. a **foreign corporation** is one doing business in any state other than its state of incorporation (it is a domestic corporation in its state of incorporation)
 - 1). must obtain a certificate of authority from the Secretary of State in any state it is doing business (i.e. it must file, pay fees and name a resident agent)
 - 2). failure to register may make the corporation liable for fines and preclude the corporation from suing anyone in that state
 - b. **professional corporations** require a special state statute and the professional shareholder is still liable for negligence to clients
 - c. a **publicly held** corporation is owned by a large number of stockholders
 - d. a **closely held** corporation is owned by a relatively small number of stockholders, frequently relatives or friends, and transfer of stock is frequently restricted

MERGERS & CONSOLIDATIONS

1. In a merger two corporations join together and one of them survives (e.g. **A** and **B** combine and **A** is the name of the surviving entity)
2. In a consolidation two corporations join together and a new entity is formed (e.g. **A** and **B** combine and **X** emerges)
3. The merger or consolidation must be approved by the board of directors, the stockholders and the Secretary of State
 - a. a formal plan of merger is submitted to and approved by a majority of the board of directors of each corporation
 - b. a copy of the approved plan is submitted to and approved by a majority of the stockholders of each corporation (note: as a practical matter they must receive notice of the time, date and place in order to be able to vote)
 - c. dissenting shareholders may buy out of the corporation at fair market value
 - 1). this is called a **right of appraisal** or **dissenters' rights**
 - 2). must file a written objection prior to the vote, vote against merger and make a written demand for the corporation to purchase their stock
 - d. the plan is submitted to the Secretary of State who will issue a certificate of merger upon approval

STOCKHOLDERS RIGHTS & LIABILITIES

1. Stockholders have **no personal liability** for corporate debts beyond the amount of their investment in most cases
 - a. a stockholder is liable for failure to pay **present value** for their stock
 - b. **piercing the corporate veil** is disregarding the corporate entity and holding a stockholder personally liable. The corporate veil may be pierced for:
 - 1). **fraud, illegality or wrong doing**
 - 2). **undercapitalization** of the corporation when it was formed
 - 3). **commingling** of corporate and personal funds

2. Stockholders (unless also officers or directors) have **limited management rights**:
 - a. they elect board of directors (**note**: they do not elect the officers)
 - b. stockholders also have the right to approve by a **majority of votes cast** fundamental changes in the corporation
 - 1). **e.g.** mergers, consolidations and compulsory share exchanges
 - 2). **e.g.** sale or lease of substantially all of the corporation's assets (**not** buying substantially all of another corporation's assets for it may not be a major change to the acquiring corporation)
 - 3). **e.g.** amending the articles of incorporation
 - 4). **e.g.** dissolution
 - c. stockholders have **dissenters' rights** or a **right of appraisal**: the right to buy out of the corporation at fair market value for fundamental changes in the corporation
 - 1). dissenters' rights are available for
 - a). mergers, consolidations and compulsory share exchanges
 - b). sale or lease of substantially all of the corporation's assets
 - c). any amendment to the articles of incorporation that materially and adversely affects stockholders' rights concerning their shares
 - 2). stockholders must file a written objection prior to the vote, vote against the action and make a written demand for the corporation to purchase their stock
 - d. if a corporation owns 90% or more of the shares of a subsidiary corporation, the subsidiary may be merged into the parent corporation by **approval of only the parent corporation's board of directors** (called a **short-form merger**)
 - 1). approval is not required by the stockholders of the parent or the subsidiary corporation's stockholders or board of directors
 - 2). the stockholders of the subsidiary corporation would have dissenters' rights
 - 3). stockholders of the parent corporation do not have dissenters rights because there has been no fundamental change in their rights

3. Stockholders can inspect corporate books and records at reasonable times
 - a. to do so they must make a written demand upon the corporation
 - b. the demand must be made in good faith and for a proper purpose (**e.g.** no right to obtain corporate information for personal business purposes or to obtain the names and addresses of stockholders for the purpose of selling the list)
 - c. inspection may be done by the stockholder or an agent and copies can be made

4. **Preemptive right** is the right of a stockholder to purchase a proportionate amount of a new issue equal to his/her percentage of ownership (**e.g.** with preemptive rights a 40% stockholder may purchase up to 40% of a new issue)
 - a. preemptive rights may be granted or precluded by the corporation
 - b. even if granted by the corporation, preemptive rights are not available for
 - 1). treasury stock
 - 2). stock traded for property or services
 - 3). stock issued to compensate officers, directors or employees
 - 4). stock issued within 6 months of incorporation

5. **Derivative suit** is a law suit brought by a large group of stockholders on behalf of the corporation to enforce a corporate right
 - a. prior to suing, a demand must first be made on the board of directors for action
 - b. suit is brought in the name of the corporation for a harm to corporation
 - 1). **e.g.** derivative suits may be brought to recover damages for management's ultra vires acts, a managerial breach of duty or to recover improper dividends
 - 2). derivative suits must be brought for a corporate harm and not to enforce personal stockholder rights (**e.g.** compel payment of a proper declared dividend, compel inspection of books or records, force dissolution, etc.)
 - c. if successful, the recovery goes to corporation
6. Stockholders usually owe no fiduciary duty to others, but a majority stockholder may owe a fiduciary duty to fellow stockholders
7. **Stockholder voting agreements:** in most states stockholders may agree among themselves how they will vote (**e.g.** A and B agree to vote for each other as directors)
 - a. in most states stockholder voting agreements must be in writing to be valid
 - b. they are used frequently in closely held corporations to restrict transfer of shares
8. Upon dissolution stockholders are entitled to a proportionate share of corporate assets after all creditors have been paid

FINANCING THE CORPORATION

1. Corporations may be financed by debt securities, equity securities or retained earnings
2. **Debt securities or bonds** create a creditor-debtor relationship between the bondholder and the corporation (bondholders are not owners of the corporation)
 - a. bonds may be secured by property or **unsecured (called debentures)**
 - b. most bonds pay a fixed rate of interest, but **income bonds** condition interest payment on corporate earnings
 - c. **convertible bonds** can be exchanged for other securities of the corporation, usually preferred or common stock
3. **Equity securities** evidence an ownership interest in the corporation and are commonly called shares or stock (usually they are common stock or preferred stock)
 - a. **authorized shares** are the amount of stock legally permitted to be issued by articles of incorporation (**e.g.** if *ABC, Inc.* is only authorized to issue 500 shares, it can not issue more than 500 shares without amending its articles of incorporation)
 - b. **issued shares** are shares that have been distributed to stockholders
 - c. **outstanding shares** are shares that are currently in stockholders' hands
 - d. **treasury stock** is stock that has been issued but is not currently outstanding (it has been reacquired by the corporation)
 - 1). there are no preemptive rights with treasury stock
 - 2). there are no voting rights and no dividends with treasury stock
 - 3). a corporation may not reacquire treasury stock if it would cause insolvency
 - 4). it may be distributed as a stock dividend or resold by the corporation at any price (even less than par value) without liability to purchasers
 - e. **stock options** are an option to purchase a corporation's equity shares
 - f. **warrants** are stock options that are evidenced by a certificate
4. Consideration required for shares of stock
 - a. stock may be paid for by cash, tangible property, intangible property or services
 - 1). directors determine the value to be placed on consideration received for shares
 - 2). absent fraud, the decision of the board of directors is conclusive

- b. **par value shares** are shares that the corporation must sell at par value or higher
 - 1). if par value stock is sold at less than par it is **watered stock** and an initial purchaser is liable for the difference in price (**e.g.** In the initial issue of \$100 par value stock, X buys 10 shares at \$75 per share. X is liable for \$250.)
 - 2). subsequent purchasers are also liable if they had notice the stock was sold for less than par
 - c. **no par value shares** may be issued for any adequate amount set by the directors (in most states the judgment of directors as to adequacy is conclusive absent fraud)
5. Classes of equity shares
- a. **common stock** has no special contract rights or preferences over other stock
 - 1). may be divided into one more classes with differing rights (**e.g.** although at least one class of common stock must have voting rights, there may also be a class of common stock that doesn't have voting rights)
 - 2). usually common stockholders have the exclusive right to elect the directors
 - b. **preferred stock** is stock that has special rights over other classes of stock as to dividends and/or liquidation
 - 1). the dividend preference means that the preferred stockholder must be paid dividends before any dividends may be paid to common stockholders
 - 2). **cumulative preferred stock** has dividend carryovers to future years if the dividends are not paid in any given year (**note:** no dividend on common stock may be paid until all cumulative dividend arrearages are paid)
6. **Blue sky laws** are state laws governing stock sales

DIVIDENDS

- 1. Dividends are declared by the board of directors
 - a. there is no inherent right to stockholders for dividends
 - 1). even preferred stockholders have no inherent right to a dividend
 - 2). a court will only order a dividend to be paid if the decision of the board of directors not to declare dividends was a clear abuse of discretion
 - b. no dividends may be paid if it would make the corporation insolvent
 - 1). some states only allow dividends from earned surplus (retained earnings)
 - 2). Revised Model Business Corporation Act prohibits dividends if assets are less than liabilities (called the **net assets test**)
 - c. directors are personally liable for any wrongfully declarations of dividends
- 2. Once properly declared and communicated to stockholders, a cash dividend becomes a debt of corporation and cannot be revoked
 - a. a cash dividend may be validly revoked at the same meeting at which it was declared because no communication was made to stockholders
 - b. a shareholder who receives a dividend that was illegally or fraudulently made
 - 1). must repay the dividend if they had knowledge of the fraud or illegality
 - 2). must repay the dividend if the dividend made the corporation insolvent even if the stockholder had no knowledge of the fraud
 - 3). need not repay the dividend if the stockholder had no knowledge of the fraud and the corporation is solvent
 - c. once declared the stockholders become unsecured creditors of the corporation
- 3. A stock dividend is a distribution of additional stock to stockholders
 - a. stock dividend does not reduce the assets of the corporation and doesn't increase the stockholder's percentage of ownership or wealth (**e.g.** stock dividends have no effect on earnings and profits for federal income tax purposes)
 - b. a stock dividend is not considered a distribution and may be revoked by the board after declaration unless it has already been distributed

DIRECTORS & OFFICERS

1. Directors handle overall corporate management and set corporate policy
 - a. directors do not have the power to bind the corporation when acting individually, only when acting as a board
 - b. unless specifically authorized directors are not usually paid a salary, but where it is authorized the board of directors can fix their own compensation and that of officers
 - c. directors can be removed by the stockholders at a special meeting
 - d. directors can be removed by a court action brought by stockholders or by the corporation for fraud, dishonesty, or gross abuse of discretion
2. Officers handle day-to-day affairs and are selected by the board of directors
 - a. officers are agents of the corporation and owe the duties all agents do (**e.g.** duty of obedience, duty of due care, duty to inform and duty to account and duty of loyalty)
 - b. they may be removed by the board at any time, with or without cause
 - c. if removal breaches their employment contract the corporation is liable
3. **Business judgment rule**
 - a. directors and officers are not liable for decisions if they acted reasonably, in good faith and without an interest in the subject matter (**i.e.** no conflicts of interest)
 - b. directors may usually rely on reports of officers or agents
4. Officers and directors are liable if negligent (failure to use due care)
5. Officers and directors are fiduciaries of the corporation and its stockholders
 - a. they must act solely in the best interest of the corporation
 - 1). they may not usurp corporate opportunities that belong to the corporation for their own personal use
 - 2). they cannot compete with the corporation
 - b. they must make a full disclosure to the corporation of any personal financial interest they have in any transaction where the corporation is a party
 - 1). they may make a personal profit on a contract with their corporation by making a full disclosure and not participating in the approval process
 - 2). absent pre-approval, an officer or director may make a personal profit only if the contract is fair and reasonable to corporation
6. **Indemnification** is reimbursement of an officer or director by a corporation for personal liability incurred while acting in their corporate capacity
 - a. if the officer or director wins the lawsuit and is found not to be liable
 - 1). in many states they **may be indemnified** by corporation for legal expenses
 - 2). under the Revised Model Business Corporation Act they **must be indemnified**
 - b. if found to be liable in the law suit
 - 1). indemnification requires court approval in some states
 - 2). under the Revised Model they **may still be indemnified** by the corporation if they acted in good faith in the best interests of the corporation unless they received an unjustified financial benefit

DISSOLUTION

1. **Voluntary dissolution** requires
 - a. passage of a resolution to dissolve by a majority of the board of directors
 - b. and approval by a majority of the stockholders voting
2. A corporation can be **involuntarily dissolved by administrative or judicial action:**

- a. in an **administrative dissolution** the Secretary of State gives written notice of dissolution if deficiencies are not remedied within 60 days (**e.g.** failure to pay franchise taxes, failure to file annual report or lack of a registered agent or office)
 - b. a **judicial dissolution** may be brought by the State, stockholders or creditors
 - 1). the State can request a court dissolution if the charter was obtained by fraud or if the corporation has exceeded or abused its legal authority
 - 2). stockholders can request court dissolution if the corporation is hopelessly deadlocked, acting illegally or oppressively, or for waste of corporate assets
 - 3). creditors can request court dissolution if the corporation is insolvent
3. Upon dissolution, first the creditors of the corporation are paid and then the remaining assets of the corporation are distributed on a pro rata basis among the shareholders

S CORPORATIONS

The shareholders of corporations may consent to be treated under Subchapter S of the Internal Revenue Code. These are referred to as S Corporations, or sometimes Subchapter S Corporations. The corporate structure itself does not change. In fact, most of the language addressing what is referred to as the C Corporations remains intact. What is now changed is how the entity is taxed. While much is written about the distinctions between the taxation of a partnership and an S Corporation, the flow-through nature of the items of income, deductions, credits and losses is quite similar to that of a partnership.

ELIGIBILITY

In order to be a qualified S Corporation, there are strict limitations which must be adhered to. Failure to maintain compliance with these provisions generally means the termination of S Corporation status.

SHAREHOLDER REQUIREMENTS

The maximum number of shareholders is 100. For purposes of this test, a husband and wife are considered one shareholder. **Eligible** shareholders include:

- Individuals
- Estates of a decedent and bankruptcy estates
- Grantor trusts, voting trusts, qualified Subchapter S trusts, and "electing small business trusts"

Ineligible shareholders include:

- Partnerships (could circumvent the number of shareholder rules)
- Corporations
- Certain trusts
- Non-resident aliens

CLASSES OF STOCK

An S Corporation is only allowed one class of stock. This means an S Corporation cannot have common and preferred stock. However, it is possible to have voting and non-voting common stock as long as the rights as to shareholder distributions and liquidations are identical.

DEBT INSTRUMENTS

In general, debt instruments (amounts payable to the shareholders whether they are straight debt or deferred compensation) are not considered a second class of stock. A safe harbor exists for unwritten loans from the corporation to the shareholder if the amount is under \$10,000.

PASSIVE INVESTMENT INCOME LIMITATION

If, prior to becoming an S Corporation, a corporation has accumulated earnings and profits, the Code imposes a passive investment income limitation. If that corporation has passive investment income in excess of 25% of gross receipts for three consecutive taxable years, the S Corporation election is terminated as of the beginning of the next year. Included in the definition of passive investment income is interest, dividends, capital gains and rents (unless significant duties are performed by the corporation as landlord).

ELECTION PROCEDURES

In order to make a valid S Corporation election, **all the shareholders** must consent in writing. Form 2553 must be filed by the 15th day of the third month of the year in which the election is to be valid, or anytime during the preceding year. For a new corporation, that date begins the first day (1) the corporation has shareholders, (2) acquires assets or (3) starts business. The election is **not** made every year.

Example 5: K Corporation has been in existence since 1980. On March 12, 2003, R, the corporation's sole shareholder consents to be taxed as an S Corporation. R must file Form 2553 with the Internal Revenue Service by March 15, 2003 in order to be treated as an S Corporation for the 2003 calendar year.

LOSS OF THE S CORPORATION ELECTION

In general, the S Corporation election remains in effect until it is revoked. The revocation may be voluntary or involuntary. A voluntary revocation may be made when the shareholders of the majority of the shares simply consent to the termination. To be valid for that year, the revocation must be filed by the 15th day of the third month of the taxable year.

An involuntary termination occurs when the S Corporation no longer qualifies due to one of the following factors:

- The number of shareholders exceed 75
- An additional class of stock is issued
- The corporation fails the passive investment income limitation
- A nonresident shareholder becomes a shareholder

After the election has been terminated, the general rule is that the shareholders must wait five years before a new election can be made. However, the IRS is allowed to make exception to this rule under the following conditions:

- There is an ownership change of more than 50% of the stock after the first year of the termination.
- The event causing the termination was not reasonably in the control of the majority of the shareholders or the S Corporation.

Chapter Two: Corporations – Subchapter C

Multiple Choice Questions

1. Rice is a promoter of a corporation to be known as Dex Corp. On January 1, 1985, Rice signed a nine-month contract with Roe, a CPA, which provided that Roe would perform certain accounting services for Dex. Rice did not disclose to Roe that Dex had not been formed. Prior to the incorporation of Dex on February 1, 1985, Roe rendered accounting services pursuant to the contract. After rendering accounting services for an additional period of six months pursuant to the contract, Roe was discharged without cause by the board of directors of Dex. In the absence of any agreements to the contrary, who will be liable to Roe for breach of contract?

- Both Rice and Dex.
- Rice only.
- Dex only.
- Neither Rice nor Dex.

2. Which of the following provisions must a for-profit-corporation include in its Articles of Incorporation to obtain a corporate charter?

- Provision for issuance of voting stock.
- Name of the corporation.

- I only.
- II only.
- Both I and II.
- Neither I nor II.

3. Under the Revised Model Business Corporation Act, which of the following must be contained in a corporation's articles of incorporation?

- Quorum voting requirements.
- Names of stockholders.
- Provisions for issuance of par and non-par shares.
- The number of shares the corporation is authorized to issue.

4. Absent a specific provision in its articles of incorporation, a corporation's board of directors has the power to do all of the following, **except**

- Repeal the bylaws.
- Declare dividends.
- Fix compensation of directors.
- Amend the articles of incorporation.

5. Which of the following facts is(are) generally included in a corporation's articles of incorporation?

	<i>Name of registered <u>agent</u></i>	<i>Number of authorized <u>shares</u></i>
a.	Yes	Yes
b.	Yes	No
c.	No	Yes
d.	No	No

6. Under the Revised Model Business Corporation Act, which of the following statements regarding a corporation's bylaws is(are) correct?

- A corporation's initial bylaws shall be adopted by either the incorporators or the board of directors.
 - A corporation's bylaws are contained in the articles of incorporation.
- I only
 - II only.
 - Both I and II.
 - Neither I nor II.

7. Which of the following statements best describes an advantage of the corporate form of doing business?

- Day to day management is strictly the responsibility of the directors.
- Ownership is contractually restricted and is not transferable.
- The operation of the business may continue indefinitely.
- The business is free from state regulation.

8. Destiny Manufacturing, Inc., is incorporated under the laws of Nevada. Its principal place of business is in California and it has permanent sales offices in several other states. Under the circumstances, which of the following is correct?

- California may validly demand that Destiny incorporate under the laws of the state of California.
- Destiny must obtain a certificate of authority to transact business in California and the other states in which it does business.
- Destiny is a foreign corporation in California, but **not** in the other states.
- California may prevent Destiny from operating as a corporation if the laws of California differ regarding organization and conduct of the corporation's internal affairs.

9. Which of the following statements is a general requirement for the merger of two corporations?
- The merger plan must be approved unanimously by the stockholders of both corporations.
 - The merger plan must be approved unanimously by the boards of both corporations
 - The absorbed corporation must amend its articles of incorporation.
 - The stockholders of both corporations must be given due notice of a special meeting, including a copy or summary of the merger plan.
10. Under the Revised Model Business Corporation Act, a merger of two public corporations usually requires all of the following **except**
- A formal plan of merger.
 - An affirmative vote by the holders of a majority of each corporation's voting shares.
 - Receipt of voting stock by all stockholders of the original corporations.
 - Approval by the board of directors of each corporation.
11. The limited liability of a stockholder in a closely-held corporation may be challenged successfully if the stockholder
- Undercapitalized the corporation when it was formed.
 - Formed the corporation solely to have limited personal liability.
 - Sold property to the corporation.
 - Was a corporate officer, director, or employee.
12. The corporate veil is most likely to be pierced and the shareholders held personally liable if
- The corporation has elected S corporation status under the Internal Revenue Code.
 - The shareholders have commingled their personal funds with those of the corporation.
 - An ultra vires act has been committed.
 - A partnership incorporates its business solely to limit the liability of its partners.
13. Which of the following actions may be taken by a corporation's board of directors without stockholder approval?
- Purchasing substantially all of the assets of another corporation.
 - Selling substantially all of the corporation's assets.
 - Dissolving the corporation.
 - Amending the articles of incorporation.
14. A corporate stockholder is entitled to which of the following rights?
- Elect officers.
 - Receive annual dividends.
 - Approve dissolution.
 - Prevent corporate borrowing.
15. Under the Revised Model Business Corporation Act, which of the following actions by a corporation would entitle a stockholder to dissent from the action and obtain payment of the fair value of his/her shares?
- An amendment to the articles of incorporation that materially and adversely affects rights in respect of a dissenter's shares because it alters or abolishes a preferential right of the shares.
 - Consummation of a plan of share exchange to which the corporation is a party as the corporation whose shares will be acquired, if the stockholder is entitled to vote on the plan.
- I only.
 - II only.
 - Both I and II.
 - Neither I nor II.
16. A parent corporation owned more than 90% of each class of the outstanding stock issued by a subsidiary corporation and decided to merge that subsidiary into itself. Under the Revised Model Business Corporation Act, which of the following actions must be taken?
- The subsidiary corporation's board of directors must pass a merger resolution.
 - The subsidiary corporation's dissenting stockholders must be given an appraisal remedy.
 - The parent corporation's stockholders must approve the merger.
 - The parent corporation's dissenting stockholders must be given an appraisal remedy.
17. A stockholder's right to inspect books and records of a corporation will be properly denied if the stockholder
- Wants to use corporate stockholder records for a personal business.
 - Employs an agent to inspect the books and records.
 - Intends to commence a stockholder's derivative suit.
 - Is investigating management misconduct.

18. To which of the following rights is a stockholder of a public corporation entitled?

- a. The right to have annual dividends declared.
- b. The right to vote for the election of officers.
- c. The right to a reasonable inspection of corporate records.
- d. The right to have the corporation issue a new class of stock.

19. Under the Revised Model Business Corporation Act, when a corporation's bylaws grant stockholders preemptive rights, which of the following rights is(are) included in that grant?

	<i>The right to purchase a proportionate share of newly-issued stock</i>	<i>The right to a proportionate share of corporate assets remaining on corporate dissolution</i>
a.	Yes	Yes
b.	Yes	No
c.	No	Yes
d.	No	No

20. For what purpose will a stockholder of a publicly held corporation be permitted to file a stockholders' derivative suit in the name of the corporation?

- a. To compel payment of a properly declared dividend.
- b. To enforce a right to inspect corporate records.
- c. To compel dissolution of the corporation.
- d. To recover damages from corporate management for an *ultra vires* management act.

21. Which of the following statements is correct regarding the fiduciary duty?

- a. A director's fiduciary duty to the corporation may be discharged by merely disclosing his self-interest.
- b. A director owes a fiduciary duty to the shareholders but **not** to the corporation.
- c. A promoter of a corporation to be formed owes **no** fiduciary duty to anyone, unless the contract engaging the promoter so provides.
- d. A majority shareholder as such may owe a fiduciary duty to fellow shareholders.

22. Which of the following securities are corporate debt securities?

	<i>Convertible bonds</i>	<i>Debenture bonds</i>	<i>Warrants</i>
a.	Yes	Yes	Yes
b.	Yes	No	Yes
c.	Yes	Yes	No
d.	No	Yes	Yes

23. An owner of common stock will **not** have any liability beyond actual investment if the owner

- a. Paid less than par value for stock purchased in connection with an original issue of shares.
- b. Agreed to perform future services for the corporation in exchange for original issue par value shares.
- c. Purchased treasury shares for less than par value.
- d. Failed to pay the full amount owed on a subscription contract for no-par shares.

24. In general, which of the following statements concerning treasury stock is correct?

- a. A corporation may **not** reacquire its own stock unless specifically authorized by its articles of incorporation.
- b. On issuance of new stock, a corporation has preemptive rights with regard to its treasury stock.
- c. Treasury stock may be distributed as a stock dividend.
- d. A corporation is entitled to receive cash dividends on its treasury stock.

25. Ambrose purchased 400 shares of \$100 par value original issue common stock from Minor Corporation for \$25 a share. Ambrose subsequently sold 200 of the shares to Harris at \$25 a share. Harris did not have knowledge or notice that Ambrose had not paid par. Ambrose also sold 100 shares of this stock to Gable for \$25 a share. At the time of this sale, Gable knew that Ambrose had not paid par for the stock. Minor Corporation became insolvent and the creditors sought to hold all the above parties liable for the \$75 unpaid on each of the 400 shares. Under these circumstances

- a. The creditors can hold Ambrose liable for \$30,000.
- b. If \$25 a share was a fair value for the stock at the time of issuance, Ambrose will have no liability to the creditors.
- c. Since Harris acquired the shares by purchase, he is not liable to the creditors, and his lack of knowledge or notice that Ambrose paid less than par is immaterial.
- d. Since Gable acquired the shares by purchase, he is not liable to the creditors, and the fact that he knew Ambrose paid less than par is immaterial.

26. Which of the following rights is a holder of a public corporation's cumulative preferred stock always entitled to?

- a. Conversion of the preferred stock into common stock.
- b. Voting rights.
- c. Dividend carryovers from years in which dividends were **not** paid, to future years.
- d. Guaranteed dividends.

27. West owns 5,000 shares of \$7 cumulative preferred stock of Sky Corp. During the first year of operations, cash dividends of \$7 per share were declared on Sky's preferred stock but were never paid. In the second year of operations, dividends on Sky's preferred stock were neither declared nor paid. If Sky is dissolved, which of the following statements is correct?

- a. West will have priority over the claims of Sky's debenture bond owners.
- b. West will have priority over the claims of Sky's unsecured judgment creditors.
- c. Sky will be liable to West as an unsecured creditor for \$35,000.
- d. Sky will be liable to West as an unsecured creditor for \$70,000.

28. Johns owns 400 shares of Abco Corp. cumulative preferred stock. In the absence of any specific contrary provisions in Abco's articles of incorporation, which of the following statements is correct?

- a. Johns is entitled to convert the 400 shares of preferred stock to a like number of shares of common stock.
- b. If Abco declares a cash dividend on its preferred stock, Johns becomes an unsecured creditor of Abco.
- c. If Abco declares a dividend on its common stock, Johns will be entitled to participate with the common stock shareholders in any dividend distribution made after preferred dividends are paid.
- d. Johns will be entitled to vote if dividend payments are in arrears.

29. Price owns 2,000 shares of Universal Corp.'s \$10 cumulative preferred stock. During its first year of operations, cash dividends of \$5 per share were declared on the preferred stock but were never paid. In the second year, dividends on the preferred stock were neither declared nor paid. If Universal is dissolved, which of the following statements is correct?

- a. Universal will be liable to Price as an unsecured creditor for \$10,000.
- b. Universal will be liable to Price as a secured creditor for \$20,000.
- c. Price will have priority over the claims of Universal's bond owners.
- d. Price will have priority over the claims of Universal's unsecured judgment creditors.

30. Carr Corp. declared a 7% stock dividend on its common stock. The dividend

- a. Must be registered with the SEC pursuant to the Securities Act of 1933.
- b. Is includable in the gross income of the recipient taxpayers in the year of receipt.
- c. Has **no** effect on Carr's earnings and profits for federal income tax purposes.
- d. Requires a vote of Carr's stockholders.

31. All of the following distributions to stockholders are considered asset or capital distributions, **except**

- a. Liquidating dividends.
- b. Stock splits.
- c. Property distributions.
- d. Cash dividends.

32. Jane Cox, a shareholder of Mix Corp., has properly commenced a derivative action against Mix's Board of Directors. Cox alleges that the Board breached its fiduciary duty and was negligent by failing to independently verify the financial statements prepared by management upon which Smart & Co., CPAs, issued an unqualified opinion. The financial statements contained inaccurate information which the Board relied upon in committing large sums of money to capital expansion. This resulted in Mix having to borrow money at extremely high interest rates to meet current cash needs. Within a short period of time, the price of Mix Corp. stock declined drastically. Which of the following statements is correct?

- a. The Board is strictly liable, regardless of fault, since it owes a fiduciary duty to both the corporation and the shareholders.
- b. The Board is liable since any negligence of Smart is automatically imputed to the Board.
- c. The Board may avoid liability if it acted in good faith and in a reasonable manner.
- d. The Board may avoid liability in all cases where it can show that it lacked scienter.

33. Generally, officers of a corporation
- a. Are elected by the shareholders.
 - b. Are agents and fiduciaries of the corporation, having actual and apparent authority to manage the business.
 - c. May be removed by the board of directors without cause only if the removal is approved by a majority vote of the shareholders.
 - d. May declare dividends or other distributions to shareholders as they deem appropriate.

34. Under the Revised Model Business Corporation Act, a corporate director is authorized to
- a. Rely on information provided by the appropriate corporate officer.
 - b. Serve on the board of directors of a competing business.
 - c. Sell control of the corporation.
 - d. Profit from insider information.

35. Knox, president of Quick Corp., contracted with Tine Office Supplies, Inc., to supply Quick's stationery on customary terms and at a cost less than that charged by any other suppliers. Knox later informed Quick's board of directors that Knox was a majority stockholder in Tine. Quick's contract with Tine is
- a. Void because of Knox's self-dealing.
 - b. Void because the disclosure was made after execution of the contract.
 - c. Valid because of Knox's full disclosure.
 - d. Valid because the contract is fair to Quick.

36. Under the Revised Model Business Corporation Act, which of the following statements is correct regarding corporate officers of a public corporation?
- a. An officer may **not** simultaneously serve as a director.
 - b. A corporation may be authorized to indemnify its officers for liability incurred in a suit by stockholders.
 - c. Stockholders always have the right to elect a corporation's officers.
 - d. An officer of a corporation is required to own at least one share of the corporation's stock.

37. Which of the following must take place for a corporation to be voluntarily dissolved?
- a. Passage by the board of directors of a resolution to dissolve.
 - b. Approval by the officers of a resolution to dissolve.
 - c. Amendment of the certificate of incorporation.
 - d. Unanimous vote of the stockholders.

38. Which of the following would be grounds for the judicial dissolution of a corporation on the petition of a shareholder?
- a. Refusal of the board of directors to declare a dividend.
 - b. Waste of corporate assets by the board of directors.
 - c. Loss operations of the corporation for three years.
 - d. Failure by the corporation to file its federal income tax returns.

S CORPORATIONS

39. Which one of the following will render a corporation ineligible for S corporation status?
- a. One of the stockholders is a decedent's estate.
 - b. One of the stockholders is a bankruptcy estate.
 - c. The corporation has both voting and nonvoting common stock issued and outstanding.
 - d. The corporation has 105 stockholders.

40. Which of the following conditions will prevent a corporation from qualifying as an S Corporation?
- a. The corporation has both common and preferred stock.
 - b. The corporation has one class of stock with different voting rights.
 - c. One shareholder is an estate.
 - d. One shareholder is a grantor trust.

41. Village Corp., a calendar year corporation, began business in 1990. Village made a valid S Corporation election on December 5, 2003, with the unanimous consent of its shareholders. The eligibility requirements for S status continued to be met throughout 2004. On what date did Village's S status become effective?
- a. January 1, 2003.
 - b. January 1, 2004.
 - c. December 5, 2003.
 - d. December 5, 2004.

42. On February 10, 2003, Ace Corp., a calendar year corporation, elected S corporation status and all shareholders consented to the election. There was no change in shareholders in 2003. Ace met all eligibility requirements for S status during the preelection portion of the year. What is the earliest date on which Ace can be recognized as an S corporation?

- a. February 10, 2004.
- b. February 10, 2003.
- c. January 1, 2004.
- d. January 1, 2003.

43. Bristol Corp. was formed as a C corporation on January 1, 1980, and elected S corporation status on January 1, 1986. At the time of the election, Bristol had accumulated C corporation earnings and profits which have not been distributed. Bristol has had the same 25 shareholders throughout its existence. In 2003 Bristol's S election will terminate if it

- a. Increases the number of shareholders to 100.
- b. Adds a decedent's estate as a shareholder to the existing shareholders.
- c. Takes a charitable contribution deduction.
- d. Has passive investment income exceeding 90% of gross receipts in each of the three consecutive years ending December 31, 2002.

44. An S corporation has 30,000 shares of voting common stock and 20,000 shares of non-voting common stock issued and outstanding. The S election can be revoked voluntarily with the consent of the shareholders holding, on the day of the revocation,

	<i>Shares of voting stock</i>	<i>Shares of nonvoting stock</i>
a.	0	20,000
b.	7,500	5,000
c.	10,000	16,000
d.	20,000	0

45. After a corporation's status as an S corporation is revoked or terminated, how many years is the corporation generally required to wait before making a new S election, in the absence of IRS consent to an earlier election?

- a. 1
- b. 3
- c. 5
- d. 10

46. Tau Corp. which has been operating since 1980, has an October 31 year end, which coincides with its natural business year. On May 15, 2003, Tau filed the required form to elect S corporation status. All of Tau's stockholders consented to the election, and all other requirements were met. The earliest date that Tau can be recognized as an S corporation is

- a. November 1, 2002.
- b. May 15, 2003.
- c. November 1, 2003.
- d. November 1, 2004.

47. Which of the following is **not** a requirement for a corporation to elect S corporation status?

- a. Must be a member of a controlled group.
- b. Must confine stockholders to individuals, estates, and certain qualifying trusts.
- c. Must be a domestic corporation.
- d. Must have only one class of stock.

48. If a calendar-year S corporation does not request an automatic six-month extension of time to file its income tax return, the return is due by

- a. January 31
- b. March 15
- c. April 15
- d. June 30

49. A corporation that has been an S corporation from its inception may

	<i>Have both passive and nonpassive income</i>	<i>Be owned by a bankruptcy estate</i>
a.	No	Yes
b.	Yes	No
c.	No	No
d.	Yes	Yes

50. For the taxable year ended December 31, Elk Inc., an S corporation, had net income per books of \$54,000, which included \$45,000 from operations and a \$9,000 net long-term capital gain. During the year, \$22,500 was distributed to Elk's three equal stockholders, all of whom are on a calendar-year basis. On what amounts should Elk compute its income and capital gain taxes?

	<i>Ordinary income</i>	<i>Long-term capital gain</i>
a.	\$31,500	\$ 0
b.	\$22,500	\$ 0
c.	\$ 0	\$9,000
d.	\$ 0	\$ 0

51. If an S corporation has **no** accumulated earnings and profits, the amount distributed to a shareholder
- Must be returned to the S corporation.
 - Increases the shareholder's basis for the stock.
 - Decreases the shareholder's basis for the stock.
 - Has **no** effect on the shareholder's basis for the stock.
52. The Haas Corp., a calendar year S corporation, has two equal shareholders. For the year ended December 31, 2003, Haas had taxable income and current earnings and profits of \$60,000, which included \$50,000 from operations and \$10,000 from investment interest income. There were no other transactions that year. Each shareholder's basis in the stock of Haas will increase by
- \$50,000
 - \$30,000
 - \$25,000
 - \$0
53. Bern Corp., an S corporation, had an ordinary loss of \$36,500 for the year ended December 31, 2003. At January 1, 2003, Meyer owned 50% of Bern's stock. Meyer held the stock for 40 days in 2003 before selling the entire 50% interest to an unrelated third party. Meyer's basis for the stock was \$10,000. Meyer was a full-time employee of Bern until the stock was sold. Meyer's share of Bern's 2003 loss was
- \$0
 - \$2,000
 - \$10,000
 - \$18,250
54. An S corporation is **not** permitted to take a deduction for
- Compensation of officers.
 - Interest paid to individuals who are not stockholders of the S corporation.
 - Charitable contributions.
 - Employee benefit programs established for individuals who are not stockholders of the S corporation.
55. An S corporation may deduct
- Charitable contributions within the percentage of income limitation applicable to corporations.
 - Net operating loss carryovers.
 - Foreign income taxes.
 - Compensation of officers.
56. Zinco Corp. was a calendar year S corporation. Zinco's S status terminated on April 1, 2003, when Case Corp. became a shareholder. During 2003 (365-day calendar year), Zinco had nonseparately computed income of \$310,250. If no election was made by Zinco, what amount of the income, if any, was allocated to the S short year for 2003?
- \$233,750
 - \$155,125
 - \$76,500
 - \$0
57. As of January 1, 2003, Kane owned all the 100 issued shares of Manning Corp., a calendar year S corporation. On the 41st day of 2003, Kane sold 25 of the Manning shares to Rodgers. For the year ended December 31, 2003 (a 365-day calendar year), Manning had \$73,000 in nonseparately stated income and made no distributions to its shareholders. What amount of nonseparately stated income from Manning should be reported on Kane's 2003 tax return?
- \$56,750
 - \$54,750
 - \$16,250
 - \$0
58. With regard to S corporations and their stockholders, the "at risk" rules applicable to losses
- Depend on the type of income reported by the S corporation.
 - Are subject to the elections made by the S corporation's stockholders.
 - Take into consideration the S corporation's ratio of debt to equity.
 - Apply at the shareholder level rather than at the corporate level.
59. An S corporation's accumulated adjustments account, which measures the amount of earnings that may be distributed tax-free,
- Must be adjusted downward for the full amount of federal income taxes attributable to any taxable year in which the corporation was a C corporation.
 - Must be adjusted upward for the full amount of federal income taxes attributable to any taxable year in which the corporation was a C corporation.
 - Must be adjusted upward or downward for only the federal income taxes affected by capital gains or losses, respectively, for any taxable year in which the corporation was a C corporation.
 - Is **not** adjusted for federal income taxes attributable to a taxable year in which the corporation was a C corporation.

60. An S corporation may
- Have both common and preferred stock.
 - Have a corporation as a shareholder.
 - Be a member of an affiliated group.
 - Have as many as 100 shareholders.

61. Brooke, Inc., an S corporation, was organized on January 2, 2003, with two equal stockholders who materially participate in the S corporation's business. Each stockholder invested \$5,000 in Brooke's capital stock, and each loaned \$15,000 to the corporation. Brooke then borrowed \$60,000 from a bank for working capital. Brooke sustained an operating loss of \$90,000 for the year ended December 31, 2003. How much of this loss can each stockholder claim on his 2003 income tax return?

- \$5,000
- \$20,000
- \$45,000
- \$50,000

62. A shareholder's basis in the stock of an S corporation is increased by the shareholder's pro rata share of income from

	<u>Tax-exempt interest</u>	<u>Taxable interest</u>
a.	No	No
b.	No	Yes
c.	Yes	No
d.	Yes	Yes

63. Under the Revised Model Business Corporation Act, which of the following conditions is necessary for a corporation to achieve a successful voluntary dissolution?

- Successful application to the secretary of state in which the corporation holds its primary place of business.
- A recommendation of dissolution by the board of directors and approval by a majority of all shareholders entitled to vote.
- Approval by the board of directors of an amendment to the certificate of incorporation calling for the dissolution of the corporation.
- Unanimous approval of the board of directors and two-thirds vote of all shareholders entitled to vote on a resolution of voluntary dissolution.

Chapter Two: Corporations – Subchapter C

Other Objective Questions

NUMBER 1

Mill, Web and Trent own all the outstanding and issued voting common stock of Sack Corp. Mill owns 40%, Web own 30%, and Trent owns 30%. They also executed a written stockholders agreement in which Mill, Web, and Trent agreed to vote for each other as directors of Sack.

At the initial meeting of the incorporators, Mill, Web, and Trent were elected to the board of directors together with three non-stockholders. At the initial board of directors meeting, Mill, Web, and Trent were appointed as officers of the corporation and given three-year employment contracts.

During its first year of operations, Sack began experiencing financial difficulties, which caused disagreements among Mill, Web, and Trent as to how the business should be operated.

At the next annual stockholders' meeting, Mill was not elected to the board of directors. The new board fired Mill in a management reorganization despite there being two years left on the employment contract. The board, reasonably relying on assurances from Web and Trent regarding financial statements Web and Trent knew to be materially misstated, declared and paid a dividend that caused Sack to become insolvent.

Required:

For **Items 1 through 5**, select the correct answer from List I. An answer may be selected once, more than once, or not at all.

1. According to the stockholders' agreement, what party(ies) must be elected as director(s) of Sack?
2. According to the stockholders' agreement, what party(ies) must be appointed as officer(s) of Sack?
3. What party(ies) is (are) liable to Mill for Mill's firing?
4. What party(ies) must return the dividend to the corporation?
5. What party(ies) would be liable for declaring the illegal dividend?

<i>List I</i>
a. Mill only.
b. Web only.
c. Trent only.
d. Mill and Web only.
e. Mill and Trent only.
f. Web and Trent only.
g. Mill, Web, and Trent.
h. Neither Mill, Web, nor Trent.
i. All directors.
j. Sack Corp.

NUMBER 2

Drain Corp. has two classes of stock: 100,000 shares of authorized, issued, and outstanding voting common stock; and 10,000 shares of authorized, issued and outstanding nonvoting 5% cumulative, nonparticipating preferred stock with a face value of \$100 per share. In 1994, Drain's officers and directors intentionally allowed pollutants to be discharged by Drain's processing plant. These actions resulted in Drain having to pay penalties. Solely as a result of these penalties, no dividends were declared for the years ended December 31, 1994 and December 31, 1995. The total amount Drain paid in penalties was \$1,000,000. In 1995, Drain was able to recover the full amount of the penalties from an insurance company that had issued Drain a business liability policy. Drain's directors refused to use this money to declare a dividend and decided to hold the \$1,000,000 in a special fund to pay future bonuses to officers and directors.

Required:

Items 1 through 6 refer to the above fact pattern. For each item, select the correct answer that completes the statement.

1. The actions by Drain's officers and directors in allowing pollutants to be discharged generally would be considered a violation of the
 2. A stockholder's derivative suit, if successful, probably would result in the officers and directors being
 3. A stockholder's derivative suit, if successful, probably would result in the \$1,000,000 being considered
 4. If the \$1,000,000 was distributed to the stockholders in 1995, the distribution would be characterized as a
 5. If the \$1,000,000 was distributed in 1995, each share of the 5% cumulative preferred stock would receive
 6. If the \$1,000,000 was distributed in 1995, each share of voting common stock would receive
- | | |
|---|--|
| A. Available for distribution as a dividend | I. Liable to the corporation for \$1,000,000 |
| B. Fiduciary duty to prevent losses | J. Property dividend |
| C. Cash dividend | K. Stock dividend |
| D. Fiduciary duty of care | L. Surplus or earnings held for expansion |
| E. Fiduciary duty of loyalty | M. \$ 5.00 |
| F. Illegal dividend | N. \$ 9.00 |
| G. Immune from liability | O. \$10.00 |
| H. Liable for abuse of discretion | P. \$18.00 |

NUMBER 3

In 1990, Amber Corp., a closely-held corporation, was formed by Adams, Frank, and Berg as incorporators and stockholders. Adams, Frank, and Berg executed a written voting agreement which provided that they would vote for each other as directors and officers. In 1994, stock in the corporation was offered to the public. This resulted in an additional 300 stockholders. After the offering, Adams holds 25%, Frank holds 15%, and Berg holds 15% of all issued and outstanding stock. Adams, Frank, and Berg have been directors and officers of the corporation since the corporation was formed. Regular meetings of the board of directors and annual stockholders meetings have been held.

Required:

Items 1 through 6 refer to the formation of Amber corp. and the rights and duties of its stockholders, directors, and officers. For each item, determine whether (a), (b), or (c) is correct.

1.
 - a. Amber Corp. must be formed under a state's general corporation statute.
 - b. Amber Corp.'s Articles of Incorporation must include the names of all stockholders.
 - c. Amber Corp. must include its corporate bylaws in the incorporation documents filed with the state.
2. Amber Corp.'s initial bylaws ordinarily would be adopted by its
 - a. Stockholders.
 - b. Officers.
 - c. Directors.
3. Amber Corp.'s directors are elected by its
 - a. Officers.
 - b. Outgoing directors.
 - c. Stockholders.
4. Amber Corp.'s officers ordinarily would be elected by its
 - a. Stockholders.
 - b. Directors.
 - c. Outgoing officers.
5. Amber Corp.'s day-to-day business ordinarily would be operated by its
 - a. Directors.
 - b. Stockholders.
 - c. Officers.
6.
 - a. Adams, Frank, and Berg must be elected as directors because they own 55% of the issued and outstanding stock.
 - b. Adams, Frank, and Berg must always be elected as officers because they own 55% of the issued and outstanding stock.
 - c. Adams, Frank, and Berg must always vote for each other as directors because they have a voting agreement.

NUMBER 4

Edwards, a director and a 10% stockholder in National Corp., is dissatisfied with the way National's officers, particularly Olsen, the president, have been operating the corporation. Edwards has made many suggestions that have been rejected by the board of directors, and has made several unsuccessful attempts to have Olsen removed as president.

National and Grand Corp. had been negotiating a merger that Edwards has adamantly opposed. Edwards has blamed Olsen for initiating the negotiation and has urged the board to fire Olsen. National's board refused to fire Olsen. In an attempt to defeat the merger, Edwards approached Jenkins, the president of Queen Corp., and contracted for Queen to purchase several of National's assets. Jenkins knew Edwards was a National director, but had never done business with National. When National learned of the contract, it notified Queen that the contract was invalid.

Edwards filed an objection to the merger before the stockholders' meeting called to consider the merger proposal was held. At the meeting, Edwards voted against the merger proposal.

Despite Edwards' efforts, the merger was approved by both corporations. Edwards then orally demanded that National purchase Edwards' stock, citing the dissenters rights provision of the corporation's by-laws, which reflects the Model Business Corporation Act.

National's board has claimed National does not have to purchase Edwards' stock.

As a result of the above:

Edwards initiated a minority stockholder's action to have Olsen removed as president and to force National to purchase Edwards' stock.

Queen sued National to enforce the contract and/or collect damages.

Queen sued Edwards to collect damages.

Required:

Answer the following questions and give the reasons for your answers.

- a. Will Edwards be successful in a lawsuit to have Olsen removed as president?
- b. Will Edwards be successful in a lawsuit to have National purchase the stock?
- c.
 1. Will Queen be successful in a lawsuit against National?
 2. Will Queen be successful in a lawsuit against Edwards?

NUMBER 5

On May 12, 1987, West purchased 6% of Ace Corp.'s outstanding \$3 cumulative preferred stock and 7% of Ace's outstanding common stock. These are the only two classes of stock authorized by Ace's charter. Both classes of stock are traded on a national stock exchange. Ace uses the calendar year for financial reporting purposes.

During 1987 and 1988, Ace neither declared dividends nor recorded dividends in arrears as a liability on its books. West was disturbed about this and, on February 8, 1989, sent a written demand to examine Ace's books and records to determine Ace's financial condition. Ace has refused to permit West to examine its books and records.

As a result of the foregoing, West has made the following assertions:

Ace should have recorded the dividends in arrears for 1987 and 1988 as a liability that, in effect, would treat West as a general creditor to the extent of the dividends in arrears.

West is entitled to examine Ace's books and records.

Required: In separate paragraphs, discuss West's assertions. Indicate whether such assertions are correct and the reasons therefor. Do **not** consider securities laws.

NUMBER 6

Walsh is evaluating two different investment opportunities. One requires an investment of \$100,000 to become a limited partner in a limited partnership that owns a shopping center. The other requires an investment of \$100,000 to purchase 3% of the voting common stock of a corporation engaged in manufacturing. Walsh is uncertain about the advantages and disadvantages of being a limited partner versus being a shareholder. The issues of most concern to Walsh are:

The right to transfer a limited partnership interest versus shares of stock.

The liability as a limited partner versus that of a shareholder for debts incurred by a limited partnership or a corporation.

The right of a limited partner versus that of a shareholder to participate in daily management.

The right of a limited partner to receive partnership profits versus the right of a shareholder to receive dividends from a corporation.

Required:

Briefly identify and discuss the basic differences and similarities in the formation of a limited partnership and a corporation. Discuss in separate paragraphs the issues raised by Walsh. (Ignore tax and securities laws.)

NUMBER 7

Cox is a disgruntled shareholder of Hall, Inc. She has owned 6% of the voting stock for several years. Hall is a corporation with 425 shareholders. However, the members of the Hall family own 65% of the corporate stock, dominate the board, and are the principal officers of the corporation. There is one minority board member. Recently, there have been major changes in Hall's board and its officers as the older generation of the family has relinquished the management in favor of the next generation of Halls. It is the action of this new board and management that has caused Cox to contemplate taking drastic action against the current board and officers.

Specifically, she objects to the following:

The board has drastically cut the dividend payments on the common stock. The board's explanation is that additional funds for expansion or acquisitions are critical for the growth of the corporation. The earnings have been increasing at a rate of 10% per year during this period. Cox claims that the real reason for the dividend cut is to force minority shareholders such as herself to sell. This claim is based on conjecture on her part. Cox is considering an action against the board to compel reinstatement of the prior dividend payout.

The board also decided to sell 5,000 shares of treasury stock at \$10 a share to raise additional capital. The stock in question had originally been sold at \$16 a share and had a \$12 par value. It was reacquired at \$13 per share. Cox first alleges that the corporation is prohibited from acquiring its own shares without specific authorization in the articles of incorporation. The articles of incorporation are silent on this matter. Cox also asserts that the corporation is prohibited from selling the shares at a price less than par.

Substantial salaries are paid to the officers of the corporation. Salaries of the newcomers have been increased at an annual rate of 10%, which is far in excess of raises voted by the old board. Cox has evidence to show that the corporation's salary scale has risen from the top 50% to the top 33-1/3% of salaries paid by similar corporations in the industry. Cox asserts that based upon the recipients' ages, experience and contribution to the corporation, they are so grossly overpaid that the payments constitute a waste of corporate assets. Cox demands that the salary increases be repaid.

The board has become factionalized because of hostility within the Hall family. Cox claims that this acrimony has generated useless debate and bickering and is counterproductive to the continued success of Hall, Inc. The majority has threatened to oust the opposition at the next election of the board. Cox claims that all of these actions are seriously impairing the effective management of the corporation and she is contemplating seeking a court-ordered dissolution of Hall.

Required: Answer the following, setting forth reasons for any conclusions stated.

Discuss the merits of each of the above claims and indicate the probable outcome of any court action taken by Cox personally or taken by her for and on behalf of the corporation.

Chapter Two: Corporations – Subchapter C

Multiple Choice Answers

1. **(a) Promoters are primarily liable on pre-incorporation contracts** they make. They **remain primarily liable, even if the corporation accepts the contract**. Rice (the promoter) is primarily liable for the contract made with Roe. The corporation, by using Roe's services for six months after incorporation, had impliedly accepted the contract and would be liable also. The only answer that indicates that both Rice and Dix are liable is (a).
2. **(c) The articles of incorporation must contain provisions as to stock** to specifically include the amount of authorized shares, the par value of the stock and the classes of the stock **to include which stock has voting rights**. It **must also contain the names of the corporation**, its registered agent, and all incorporators. Only answer (c) reflects that both provisions as to the issuance of voting stock and the name of the corporation must be included.
3. **(d) The articles of incorporation must contain provisions as to stock to specifically include the amount of authorized shares**, the par value of the stock and the classes of the stock to include which stock has voting rights. Answers (a) and (b) are incorrect because the articles of incorporation need not contain quorum voting requirements or the names of stockholders. Answer (c) is incorrect because although the par value of stock will be listed if there is par value stock, there is no requirement that there be par value stock or no par value stock.
4. **(d) Stockholders get to vote on fundamental changes in the corporation**. This specifically **includes the right to vote on** mergers and consolidations, dissolution and **amending the articles of incorporation**. Thus, the board of directors would not have the power to amend the articles of incorporation because it would require stockholder approval. Answers (a), (b) and (c) are incorrect because directors do have the power to repeal the bylaws, declare dividends and fix their own compensation.
5. **(a) The articles of incorporation must contain provisions as to stock to specifically include the amount of authorized shares**. It **must also contain the names of the corporation, its registered agent**, and all incorporators. Only answer (a) states that the articles of incorporation must contain the name of the registered agent and the number of authorized shares.
6. **(a) The bylaws of a corporation govern the corporation's internal management**. The **bylaws may be adopted by either the incorporators or the board of directors**; thus I is a correct statement. The **bylaws are not filed with the state** as are the articles of incorporation. Thus, II is not a correct statement because the bylaws are not contained in the articles of incorporation.
7. **(c) One of the advantages of the corporate form** is that a **corporation has perpetual existence and therefore may continue to do business indefinitely**. Answer (a) is incorrect because it is the officers, not the directors, that are responsible for day to day management. Answer (b) is incorrect because another advantage of the corporation is that shares of a corporation are freely transferable, unless specifically restricted by contract. Answer (d) is incorrect because a disadvantage of the corporate form is a greater degree of governmental supervision.
8. **(b) A foreign corporation is one doing business in any state other than their state of incorporation**. A **foreign corporation must obtain a certificate of authority from each state in which they do business**. Thus, Destiny is a foreign corporation in California because they were incorporated in Nevada and they were doing business in California. Destiny must obtain a certificate of authority from California and all other states in which it does business. Answer (a) is incorrect because incorporation is not required merely because a corporation is doing business in a state. Answer (c) is incorrect because Destiny is a foreign corporation in any state in which it does business. Answer (d) is incorrect because Destiny as a Nevada corporation is only required to comply with Nevada's requirements for incorporation and not California's requirements.

9. **(d)** A merger of two corporations requires the approval of a majority of both boards of directors and the approval of a majority of the voting stockholders of both corporations. The **corporations must submit a copy of the merger plan to all stockholders and provide notice of the time and the place of the meeting at which the vote will occur**. Answers (a) and (b) are incorrect because unanimous approval is not required by either the stockholders or the directors. Answer (c) is incorrect because the absorbed corporation no longer exists and, thus, has no articles of incorporation to amend.

10. **(c)** A merger of two corporations requires the approval of a majority of both boards of directors and the approval of a majority of the voting stockholders of both corporations. The **corporations must submit a copy of the merger plan to all stockholders** and provide notice of the time and the place of the meeting at which the vote will occur. Answers (a), (b) and (d) are incorrect because a formal plan of merger is required, it must be submitted to the stockholders and receive approval of the majority of those voting and it must receive the approval of a majority of the board of directors. Answer (c) is correct because receipt of voting stock by all stockholders of both corporations is not required.

11. **(a)** A stockholder may be held personally liable for corporate debts (**piercing the corporate veil**). Specifically this **may be done by a showing of fraud, undercapitalization of the corporation** and commingling of corporate and personal funds by the stockholder. Thus, the corporate veil may be pierced if the stockholder undercapitalized the corporation when it was formed. Answer (b) is incorrect because one of the principal reasons for choosing the corporate form over others is to obtain limited personal liability. It is not grounds to pierce the corporate veil. Answers (c) and (d) are incorrect because the mere fact that a stockholder sold property to the corporation or was an officer, director or employee is insufficient grounds to pierce the corporate veil.

12. **(b)** A stockholder may be held personally liable for corporate debts (**piercing the corporate veil**). Specifically this **may be done by a showing of fraud, undercapitalization of the corporation and commingling of corporate and personal funds** by the stockholder. Thus, the corporate veil may be pierced if the stockholder commingled their personal funds with those of the corporation. Answers (a), (c) and (d) are incorrect because choosing S corporation status, commission of an ultra vires act and incorporation to obtain limited personal liability are all insufficient grounds to pierce the corporate veil.

13. **(a)** **Stockholders get to vote on fundamental changes** in the corporation. This specifically **includes the right to vote on** mergers, consolidations, compulsory share exchanges, **sale of substantially all of the corporation's assets (but not buying all of another corporation's assets)**, dissolutions and amending the articles of incorporation. Selling substantially all of the corporation's assets, dissolving the corporation and amending the articles of incorporation are all examples of fundamental changes that would require stockholder approval. Answer (a) is correct because purchasing substantially all of the assets of another corporation may be a minor matter to the acquiring corporation and thus not constitute a fundamental change requiring a stockholder vote.

14. **(c)** **Stockholders get to vote on fundamental changes** in the corporation. This specifically **includes the right to vote on** mergers, consolidations, compulsory share exchanges, sale of substantially all of the corporation's assets (but not buying all of another corporation's assets), **dissolutions** and amending the articles of incorporation. Answer (a) is incorrect because stockholders do not get to elect officers. They elect directors. Answer (b) is incorrect because there is no inherent right to receive dividends. Answer (d) is incorrect because stockholders cannot prevent corporate borrowing. Corporate borrowing need not involve a fundamental change in the corporation and stockholders may only vote on fundamental changes.

15. **(c)** **Stockholders have dissenters' rights or a right of appraisal for certain fundamental changes in the corporation**. Such **changes include** mergers, consolidations, **compulsory share exchanges**, sale of substantially all of the corporation's assets (but not buying all of another corporation's assets) **and any amendment to the articles of incorporation that materially and adversely affects stockholders' rights** concerning their shares. I is a correct statement because dissenters' rights would be available for an amendment that materially and adversely affected a preferential right of the stockholders' shares. II is a correct statement because dissenters' rights are available for mergers and consolidations and would thus be available if a corporation's shares were being acquired by another business.

16. **(b) When a corporation owns 90% or more of the shares of a subsidiary corporation, the subsidiary may be merged into the parent corporation without the approval of the stockholders of either the parent corporation or the subsidiary corporation and without the approval of the subsidiary corporations board of directors. This is called a short-form merger. Thus, answers (a) and (c) are incorrect. In a short-form merger stockholders of the subsidiary corporation have dissenters' rights, but the stockholders of the parent corporation do not. Thus, answer (b) is correct and answer (d) is incorrect.**

17. **(a) A stockholder has the right to inspect books and records of the corporation at reasonable times and upon written demand. They lose this right if they have an improper motive. Obtaining corporate information for use in a personal business would be an improper motive. Answer (b) is incorrect because the stockholder may use an agent to inspect. Answers (c) and (d) are incorrect because commencing a derivative suit on behalf of the corporation and investigating management misconduct both have the proper motive of attempting to protect their investment.**

18. **(c) A stockholder has the right to inspect books and records of the corporation at reasonable times and upon written demand. Answer (a) is incorrect because there is no inherent right to dividends for stockholders. Answer (b) is incorrect because stockholders elect directors, not officers. Officers are appointed by the directors. Answer (d) is incorrect because stockholders do not generally have the right to participate in management. They have only two management rights: electing directors and voting on fundamental changes in the corporation. They do not have the right to have the corporation issue a new class of stock as this is not a fundamental change in the corporation.**

19. **(b) By definition, preemptive rights are the right of a stockholder to purchase a proportionate amount of a new issue equal to his/her percentage of ownership. Although stockholders have the right upon dissolution to a proportionate share of corporate assets after all creditors have been paid, this is not preemptive rights.**

20. **(d) A derivative suit is a law suit brought by a large group of stockholders on behalf of the corporation to enforce a corporate right. Derivative suits may specifically be brought to recover damages for management's ultra vires acts. A derivative suit must be brought for a corporate harm and cannot be brought to enforce personal stockholder rights. Answers (a), (b) and (c) are incorrect because compelling payment of a properly declared dividend, inspecting corporate records and compelling dissolution of the corporation are personal rights of stockholders and not a harm to the corporation itself.**

21. **(d) Although stockholders usually do not owe a fiduciary duty to others, a majority stockholder may owe a fiduciary duty to fellow stockholders. This is due to the fact that a majority stockholder is in a position of control. Answer (b) is incorrect because a director owes a fiduciary duty of loyalty to the corporation and to the stockholders. Answer (a) is incorrect because disclosure by itself will not discharge a director's fiduciary duty of loyalty. Answer (c) is incorrect because a promoter owes a duty of loyalty to subscribers, future stockholders and the corporation.**

22. **(c) Debt securities or bonds create a creditor-debtor relationship between the bondholder and the corporation and are not an ownership interest in the corporation. Convertible bonds can be exchanged for other corporate securities. Debenture bonds are unsecured bonds. Since both convertible bonds and debenture bonds are types of bonds, they are debt securities. Warrants are stock options that are evidenced by a certificate. Stock options are equity securities and are not debt securities.**

23. **(c) Treasury stock can be sold by the corporation at a price that is less than par value. Thus, one who purchased treasury stock for less than par value would not be liable. If par value stock was purchased at less than par in connection with an original issue, it would be watered stock and the purchaser would be liable for the difference in price. Thus, (a) is incorrect. Answer (b) is incorrect because a stockholder must pay present value for stock. An agreement to perform future services in exchange for stock would leave the stockholder liable until the future services were performed. Answer (d) is incorrect because a stockholder must pay present value for stock. Failure to pay the full amount owed on a subscription contract would leave the stockholder liable for the amount unpaid.**

24. **(c) Treasury stock may be distributed as a stock dividend. Answer (a) is incorrect because a corporation may purchase treasury stock as long as it has the surplus funds to do so. The power to purchase does not require specific**

authorization by the articles of incorporation. Answer (b) is incorrect because there are no pre-emptive rights with treasury stock. Answer (d) is incorrect because there are no cash dividends paid on treasury stock.

25. **(a) If par value stock is sold at less than par in an original issue**, the stock is watered stock and the **purchaser is liable for the difference between the amount paid and the par value**. All other purchasers with notice that the stock was being sold for less than par value would also be liable for the difference in price. Ambrose purchased 400 shares of \$100 par value stock in an original issue for \$25 a share. Ambrose is therefore liable for \$75 per share, the difference between the \$25 per share paid and \$100 par value. The total amount of Ambrose's liability would be \$75 times the 400 shares purchased, or \$30,000. Thus, answer (a) is correct and (b) is incorrect. Answer (c) is incorrect because subsequent purchasers are only liable if they had notice that the stock was being sold for less than par. The lack of notice by Harris would be material. Answer (d) is incorrect because Gable's purchase with knowledge that the stock was sold at less than par would make Gable liable.

26. **(c) Cumulative preferred stock entitles the holder to a dividend carryover to future years if the dividend is not paid in any given year**. Answer (a) is incorrect because it does not permit the holder to convert preferred stock into common stock. Answer (b) is incorrect because cumulative preferred stock is usually non-voting. Answer (d) is incorrect because no stockholder has an inherent or guaranteed right to dividends.

27. **(c) Once a dividend is duly declared by the board of directors, the stockholders become unsecured creditors of the corporation**. Since \$7 per share dividend on Sky's preferred stock was declared and West owned 5,000 shares, Sky is liable to West as an unsecured creditor for \$35,000 (\$7 times 5,000 shares). Answers (a) and (b) are incorrect because West as an unsecured creditor does not have a priority over any other creditor. Answer (d) is incorrect because no other dividends were declared on the preferred stock. Thus, West is only entitled to \$35,000, not \$70,000.

28. **(b) Once a dividend is duly declared by the board of directors, the stockholders become unsecured creditors of the corporation**. Thus, once Abco declares a cash dividend, Johns became an unsecured creditor of Abco. Answer (a) is incorrect because a preferred stockholder is not entitled to convert preferred stock into common stock unless this right is specifically authorized. Answer (c) is incorrect because Johns is a holder of cumulative preferred stock, not participating preferred stock. Only participating preferred stock shareholders may participate with common stock shareholders on dividend distributions. Answer (d) is incorrect because cumulative preferred stock is usually non-voting stock. Whether voting or non-voting depends on the stock, not whether dividend payments are in arrears.

29. **(a) Once a dividend is duly declared by the board of directors, the stockholders become unsecured creditors of the corporation**. Since Universal declared a \$5 per share dividend on their preferred stock and Price owned 2,000 shares, Universal would be liable to Price as an unsecured creditor for \$10,000 (\$5 per share times 2,000 shares). Answer (b) is incorrect because Price is not a secured creditor. Additionally, Price is not entitled to \$20,000 because no other dividends were declared. Answers (c) and (d) are incorrect because Price is an unsecured creditor and does not have a priority over any other creditor.

30. **(c) Stock dividends have no effect on earnings or profits of a corporation for federal income tax purposes**. Answer (a) is incorrect because a stock dividend is a "no sale transaction" wherein a corporation is dealing exclusively with existing shareholders without payment of a commission. No sale transactions are exempt from registration under the Securities Act of 1933. Answer (b) is incorrect because stock dividends are not usually treated as gross income for federal tax purposes. Answer (d) is incorrect because dividends are declared by the board and do not require stockholder approval. Stockholders may only vote to elect directors and on fundamental changes in the corporation.

31. **(b) A stock split is a type of stock dividend and neither reduces the assets of a corporation nor increases the stockholder's percentage of ownership**. It is not considered a distribution and **does not distribute assets**. Thus, it cannot be considered an asset or capital distribution. Answer (a) is incorrect because a liquidating dividend is a distribution of capital assets to stockholders. Answer (c) and (d) are incorrect because both property distributions and cash distributions involve distribution of assets to stockholders. One distributes the assets in property and the other in cash.

32. **(c) Under the business judgment rule, directors and officers are not liable if they acted reasonably and in good faith.** Thus, the Mix's board may avoid liability by showing that it acted in good faith and in a reasonable manner. Answer (a) is incorrect because a director is not strictly liable. Answer (b) is incorrect because the negligence of the CPA firm is not automatically imputed to the board. The board may usually rely on the reports of officers and agents (like a CPA firm's report). Answer (d) is incorrect because the board can be liable without proof of scienter (intent to deceive). A director is liable for negligence, which does not require proof of scienter.

33. **(b) Officers are agents of the corporation and are therefore fiduciaries. All agents can have actual and apparent authority.** Answer (a) is incorrect because stockholders elect directors, not the officers. Answer (c) is incorrect because stockholders do not have the right to vote on removal of officers. They may only vote on the election of directors and on fundamental matters. Answer (d) is incorrect because directors declare dividends, not officers.

34. **(a) Directors may rely on reports of officers or agents.** Answers (b) and (d) are incorrect because a director is a fiduciary and must act solely in the corporation's best interest. Serving on the board of a competing company and profiting from insider information would be a breach of a director's fiduciary duty of loyalty. Answer (c) is incorrect because a director does not own control of the corporation, the majority stockholders do. Since the director does not own control of the corporation, the director can not sell control of the corporation

35. **(d) An officer or director may make a personal profit on a contract with their own corporation if they make a full disclosure and do not participate in the approval process. Absent pre-approval, they may do so only if the contract is fair and reasonable to the corporation.** Knox did not receive pre-approval for the stationery contract. However, since the price charged by Knox was less than any other supplier, the contract was fair to Quick and would be valid. Answers (a) and (b) are incorrect because the contract was valid. Answer (c) is incorrect because the disclosure was only made after the contract. Without pre-approval the contract could only be valid if it was fair and reasonable.

36. **(b) Under the Revised Model Business Corporation Act a corporation may indemnify an officer or director for liability incurred in a suit by stockholders if they acted in good faith in the best interests of the corporation.** Answer (a) is incorrect because an officer may also be a director. This is a common occurrence in business. Answer (c) is incorrect because stockholders elect directors, not officers. Answer (d) is incorrect because an officer is not required to own stock.

37. **(a) Voluntary dissolution requires both a resolution to dissolve by the board of directors and approval by a majority of the stockholders.** Answer (b) is incorrect because dissolution does not require approval by the officers. Answer (c) is incorrect because dissolution does not require an amendment to the articles of incorporation. Once the corporation is dissolved there is no need for the articles of incorporation. Answer (d) is incorrect because dissolution requires approval by a majority of the stockholders, not a unanimous vote.

38. **(b) An involuntary dissolution may be forced by stockholders for waste of corporate assets.** Answers (a), (c) and (d) are incorrect because refusal of a board to declare dividends, loss operations for three years, and failure to file federal income tax are insufficient grounds for an involuntary dissolution.

39. (d) The maximum number of shareholders allowed in an S Corporation is 100.

40. (a) An S Corporation is allowed only one class of stock. That stock may, however, have different voting rights.

41. (b) Since the shareholders of Village Corporation did not make the consent by March 15, 2003, the election takes effect on January 1, 2004 (the next year).

42. (d) Since the shareholders of Ace Corporation made the consent by March 15, 2003, the election takes effect on January 1, 2003 (the current year).

43. (d) An S Corporation may have 100 shareholders. It may also have a decedent's estate as a shareholder. However, if it has accumulated C Corporation earnings and profits, then violating the passive income rules for three consecutive years will cause the termination of the S Corporation status.

44. (c) 10,000 and 16,000. What is needed is a majority of the voting and nonvoting shares to revoke the election. In this problem the total number of shares is 50,000, therefore more than 25,000 is needed. Only answer (c) with 26,000 shares qualifies.

45. (c) 5 years. Once an S Corporation is revoked or terminated, the corporation generally may not re-elect for five years without IRS consent to an earlier election.

46. (c) November 1, 2003. In order to make a valid S Corporation election, **all the shareholders** must consent in writing. Form 2553 must be filed by the 15th day of the third month of the year in which the election is to be valid, or anytime during the preceding year. Since the election was not made by January 15, 2003, the election is effective for the following tax year beginning November 1, 2003.

47. (a) An S Corporation has restrictions on its shareholders, must be a domestic corporation and have only one class of stock. However, it does not need to be a member of a controlled group.

48. (b) March 15. This is same as for a regular C Corporation. The 15th day of the third month following the close of the taxable year.

49. (d) Yes and Yes. Since the corporation was always an S Corporation (and therefore cannot have any accumulated C Corporation earnings) the passive income is not an issue. A shareholder may be a bankruptcy estate.

50. (d) \$0 and \$0. An S Corporation is a pass-through entity. The ordinary income and long-term capital gains flow-through to its shareholders.

51. (c) Distributions to a shareholder decrease the shareholder's basis.

52. (b) \$30,000. A shareholder in an S Corporation must recognize his proportionate share of income, deductions, credits and losses. In addition, the amounts of income reported by Haas Corporation will cause each shareholder's basis to increase by their share of the income (50% of \$60,000, or \$30,000). Recognize that the total income of \$60,000 is passed through to the shareholders in their separate components of ordinary income and interest income. Also note that any tax-exempt income, while not present in this problem, also increases a shareholder's basis.

53. (b) \$2,000. Meyer's share of the \$36,500 loss is based upon two factors: (1) his share of the corporate stock and (2) the length of time holding the stock. As a 50% shareholder for 40 days, Meyer's loss is determined as follows:

$$\$36,500 \div 365 \text{ days} = \$100 \text{ per day per shareholder}$$

$$\$100 \times 40 \text{ days} = \$4,000 \text{ loss for 40 days}$$

$$\$4,000 \text{ loss} \times 50\% \text{ ownership} = \$2,000.$$

54. (c) Charitable contributions are separately stated items which are not allowed as deductions in the determination of ordinary income. Separately stated items are passed through to the individual shareholders to be used on their own returns. In this case, if the shareholder was an individual, the charitable contribution would be claimed as an itemized deduction on Schedule A. Unlike a partnership compensating its partners, the compensation of a corporation's officers is allowable as a deduction.

55. (d) An S Corporation may deduct the compensation paid to its officers in determining its ordinary income. The charitable contributions, net operating losses and foreign income taxes represent flow-through items which are required to be separately stated on the shareholders' K-1.

56. (c) \$76,500. Zinco must allocate a prorata share of the income to the S Corporation's short year. The allocation is based upon the 90 days Zinco was an S Corporation.

$$\$310,250 \div 365 \text{ days} = \$850 \text{ per day}$$

$$\$850 \times 90 \text{ days} = \$76,500$$

57. (a) \$56,750. Kane's share of the \$73,000 income is based upon two factors: (1) his share of the corporate stock and (2) the length of time holding the stock. As a 100% shareholder for 40 days, and then as a 75% shareholder for 325 days, Kane's share of the income is determined as follows:

Step 1	\$73,000	365 days	\$200 per day	
	\$200	40 days	\$8,000	(as sole shareholder)
Step 2	\$73,000	365 days	\$200 per day	
	\$200	325 days	\$65,000	total income
	\$65,000	75% ownership	\$48,750	
Step 3	Share of income as 100% shareholder		\$ 8,000	
	Share of income as 75% shareholder		<u>48,750</u>	
	Total reported income by Kane		<u>\$ 56,750</u>	

58. (d) Similar to the rules for a partnership, the "at risk" rules are determined at the shareholder level rather than at the corporate level.

59. (d) The payment of federal income taxes which are attributable to when the corporation was a C Corporation, would be reflected in the Accumulated Earnings and Profits account, not the Accumulated Adjustments Account. The AAA account measures the undistributed earnings of the S Corporation.

60. (d) A S Corporation may have up to 75 shareholders. However, it may **not** have both common and preferred stock; have a corporation as a shareholder; or be a member of an affiliated group (at least 80%).

61. (b) \$20,000. When a corporation incurs liabilities, the individual shareholders do not necessarily share in the responsibility to pay these liabilities. One characteristic of a corporation is limited liability. However, even if a shareholder was personally responsible for a debt (the shareholder guaranteed a bank loan), the shareholder's basis is not increased for the liability. This is a major difference from the rules related to partnerships. If, however, the shareholder lends money to the corporation, the shareholder's basis is increased by that amount. The basis of each shareholder determines the amount of the loss they can claim. Their basis is determined as follows:

Initial investment	\$ 5,000
Personal loan	<u>15,000</u>
Total basis	<u>\$ 20,000</u>

62. (d) A shareholder's basis is increased by the interest from **both** taxable and tax-exempt interest.

63. (b) Corporations require a recommendation by the board of directors and approval by a majority of all shareholders entitled to vote. Contrast this with a partnership, which requires the unanimous consent of all partners.

Chapter Two: Corporations – Subchapter C

Other Objective Answers

ANSWER 1

1. (G) Stockholder voting agreements are valid in most states if they are in writing. Mill, Web and Trent agreed in writing to vote for each other as directors. Thus, according to the stockholders' agreement Mill, Web and Trent must be elected as directors.
2. (H) There was no agreement made as to appointment of officers in the stockholder voting agreement of Mill, Web and Trent. Thus, neither Mill, Web nor Trent **must** be appointed as officers
3. (J) Mill was appointed as an officer of Sack Corp. and given a three year employment contract. Officers may be removed by the board at any time, with or without cause. If their removal breaches an employment contract, it is the corporation that is liable. Since Mill's termination breached his employment contract, Sack Corp. is liable.
4. (G) Although cash dividends properly declared and communicated to stockholders cannot usually be revoked, an exception exists where fraud or illegality is involved. A stockholder who receives a dividend that was fraudulently or illegally made must repay the dividend if they had knowledge of the fraud. Thus Web and Trent must repay the dividend because they had knowledge of the fraud. Also, directors are personally liable to the corporation for wrongful declarations of dividends. Thus, Web and Trent would be liable to repay the corporation for the wrongful distribution. Additionally, a dividend must be repaid if the dividend made the corporation insolvent even if the stockholder had no knowledge of the fraud. Thus, Mill must also repay the dividend because it made Sack become insolvent.
5. (F) Directors are personally liable for wrongful declarations of dividends. Since Web and Trent were the parties that knew the financial statements were materially misstated and assured the other board members of the accuracy of the financial statements, they would be liable. Mill was not a member of the board at this time, so Mill is not liable. The other directors are not liable because they reasonably relied on the assurances of Web and Trent. Directors are not liable for decisions when they act reasonably and in good faith (**business judgment rule**).

ANSWER 2

1. (E) The actions of the officers and directors in regards to the pollutants would generally be considered a violation of their duty of loyalty to the corporation. Directors and officers are agents of the corporation and therefore owe the corporation a fiduciary duty of loyalty. As such, they must act solely in the best interests of the corporation. Intentionally allowing the discharge of pollutants was not in the best interest of the corporation and resulted in \$1,000,000 penalty to the corporation. There are only two other answers that would be grammatically correct. Answer (d), fiduciary duty of care, relates to the liability of a director or officer for negligence, which is lack of due care. This is an incorrect choice because the actions of the officers and directors was intentional, not negligent. Answer (b), fiduciary duty to prevent losses, is incorrect because there is no fiduciary duty to prevent losses.
2. (H) A successful shareholder derivative suit would probably result in the directors and officers being liable for abuse of discretion. The decision not to pay dividends was solely the result of the \$1,000,000 in penalties. The board's decision to use the \$1,000,000 recovered from the insurance company for future bonuses, and not for dividends, is a clear abuse of discretion. The only other choice that would be grammatically correct is (I), liable to the corporation for \$1,000,000. This choice is incorrect because the corporation has received the \$1,000,000 from the insurance company and, therefore, was not harmed by \$1,000,000.

3. (A) A successful shareholder derivative suit would probably result in the \$1,000,000 being considered available for distribution as a dividend. To allow the \$1,000,000 to be used for bonuses would be financially rewarding the officers and directors for their illegal actions. The only other choice that would be grammatically correct is (L), surplus or earnings held for expansion. This would not be a likely choice of a court in that the sole reason dividends were not distributed was because of the \$1,000,000 in penalties.
4. (C) If the \$1,000,000 were distributed in 1995, it would be characterized as a cash dividend. The only other answers that are grammatically correct are (J) property dividend and (K) stock dividend. The distribution of cash is a cash dividend and not property or stock.
5. (O) The cumulative preferred stock holders are entitled to dividend carryovers if dividends are not paid in a given year. Thus they are entitled to dividends in both 1994 and 1995. 5% of \$100 face value would equal \$5 for each year for a total of \$10. Only answer (O) reflects \$10.
6. (N) There are 10,000 shares of preferred stock which will receive a dividend of \$10 per share for a total of \$100,000. This leaves \$900,000 remaining to be distributed to the common stockholders. With 100,000 shares of common stock outstanding, each share will receive a dividend of \$9. Only answer (N) reflects \$9.

ANSWER 3

1. (A) A Corporation must be formed pursuant to a state statute. Answer (b) is incorrect because the names of the stockholders need not be contained in the articles of incorporation. The only names that are required in the articles of incorporation are the names of all incorporators, the name of the registered agent and the name of the corporation. Answer (c) is incorrect because the bylaws need not be included in the incorporation documents.
2. (C) The bylaws are adopted by the board of directors of the corporation, usually at the organizational meeting. Directors are in charge of setting overall corporate policy. Answer (a) is incorrect because stockholders do not vote on the bylaws. Stockholders elect the board of directors and get to vote on fundamental changes in the corporation (mergers and consolidations, dissolution and amending the articles of incorporation). Answer (b) is incorrect because the officers do not adopt the bylaws, the directors do. Officers handle day-to-day affairs. Overall policy is set by the directors
3. (C) Stockholders elect the board of directors. Answers (a) and (b) are incorrect because directors are not selected by the officers or by outgoing directors.
4. (B) The officers of a corporation are selected by the board of directors. Answers (a) and (c) are incorrect because officers are not selected by the stockholders or the outgoing officers.
5. (C) The day-to-day affairs of a corporation are handled by its officers. Answer (a) is incorrect because directors handle the overall management of the corporation and set corporate policy. Answer (b) is incorrect because stockholders do not handle day-to-day affairs. They only may vote on fundamental changes in the corporation or to elect the board of directors.
6. (C) Adams, Frank and Berg executed a written contract that they would vote for each other as directors. Thus, they are required by contract to do so. Answer (a) is incorrect because there is no requirement that majority stockholders must serve as directors. If the majority stockholders did not choose to be directors, they need only vote for others to insure that they were not elected. Answer (b) is incorrect because there is no requirement that majority stockholders must serve as officers.

ANSWER 4

a. Edwards will not win the suit to have Olsen removed as president. The right to hire and fire officers is held by the board of directors. Individual stockholders, regardless of the size of their holding, have no vote in the selection of officers. Individual stockholders may exert influence in this area by voting for directors at the annual stockholders' meeting.

b. Edwards will lose the suit to have National purchase the stock. A stockholder who dissents from a merger may require the corporation to purchase his or her shares if the statutory requirements are met and would be entitled to the fair value of the stock (appraisal remedy). To compel the purchase, Edwards would have had to file an objection to the merger before the stockholders meeting at which the merger proposal was considered, vote against the merger proposal, and make a written demand that the corporation purchase the stock at an appraised price. Edwards will lose because the first two requirements were met but Edwards failed to make a written demand that the corporation purchase the stock.

c. 1. Queen will lose its suit against National to enforce the contract, even though Edwards was a National director. Jenkins may have assumed that Edwards was acting as National's agent, but Edwards had no authority to contract with Queen. A director has a fiduciary duty to the stockholders of a corporation but, unless expressly authorized by the board of directors or the officers of the corporation, has no authority to contract on behalf of the corporation. There is no implied agency authority merely by being a director.

2. Queen will win its suit against Edwards because Edwards had no authority to act for National. Edwards will be personally liable for Queen's damages.

ANSWER 5

West's assertion that Ace should have recorded the dividends in arrears for 1987 and 1988 as a liability is incorrect. A shareholder of cumulative preferred stock is entitled to receive all dividend arrearages plus any dividends for the current year before any dividends may be distributed to the shareholders of common stock. However, preferred stock represents a contribution of capital, not a debt of the corporation, and until a dividend is declared, a shareholder of cumulative preferred stock is not a creditor of the corporation. Thus, Ace was correct in not classifying the dividend arrearages as a liability because a dividend was not declared by Ace's board of directors. Ace should disclose the dividend arrearages in notes to its financial statements.

West's assertion that West is entitled to examine Ace's book and records is correct. A shareholder, upon written demand, is entitled to examine, at reasonable times, the books and records of the corporation, so long as the examination is for a proper purpose (in good faith). If the corporation refuses to permit the examination, the shareholder may obtain a court order compelling access to the books and records.

ANSWER 6

A limited partnership is formed by two or more persons under a state's limited partnership statute, having as members one or more general partners and one or more limited partners. Two or more persons desiring to form a limited partnership must execute a certificate of limited partnership that must be filed in the office of the secretary of state, or other appropriate state or local office. A corporation may be formed only under a state incorporation statute that requires that one or more incorporators sign articles of incorporation which must be filed with the secretary of state.

Unless otherwise provided in the partnership agreement, or other agreements among the partners, a limited partnership interest is assignable in whole or in part. Similarly, in the absence of a restriction in the corporation's organizational documents or other agreements among the shareholders, shares of stock are freely transferable.

A limited partner's liability for partnership debts is generally limited to the partner's investment (capital contribution) in the partnership if the interest is fully paid and non-assessable and the partner does not participate in the daily management of the business. Likewise, a shareholder's liability for a corporation's debts is generally limited to the shareholder's investment (capital contribution) in the corporation.

A limited partner cannot participate in the daily operations of the partnership's business without losing limited liability. A shareholder who is not also an officer or a director cannot participate in the daily operations of the corporation's business. However, a shareholder owning voting stock has the right to vote for a board of directors, which will manage the business affairs of the corporation. The board of directors elects officers to run the daily operations of the corporation.

A limited partner is entitled to receive a share of the partnership's profits in the manner provided in the partnership agreement. On the other hand, whether a shareholder receives dividends is generally within the discretion of the board of directors.

ANSWER 7

The action to compel reinstatement of prior dividends would fail. The declaration of dividends is a matter within the discretion of the board of directors. There are very few instances in which the board's discretion will be disturbed, and the facts of this problem are not within any of them unless Cox can prove the fraudulent purpose of the board, which she asserts.

The predominant rule gives a corporation the right to acquire its own shares. Such purchase may be made only to the extent of unreserved and unrestricted earned surplus. Capital surplus may be used only if the articles of incorporation so provide or if there is an affirmative majority vote by shareholders. The law and the facts indicate that in all probability there was no problem from the standpoint of the proper source of funds. With respect to the sale below par value there is no requirement to sell treasury shares at par value. The corporation laws require only that newly issued shares be sold at or above par value.

Cox's action to demand repayment of the salary increases would fail. The board of directors has broad discretionary power to fix salaries of officers, even if the officers also are members of the board. The courts have supported the board's determination of salary unless the amounts are grossly unreasonable. A 10 percent per year raise and the fact that the salaries are within the upper one-third of those paid by other similar corporations do not suggest salaries that would likely be found unreasonable and a waste of corporate assets.

Cox's action for dissolution would fail. The courts have power to dissolve a corporation in an action by a shareholder when the directors are deadlocked in the management of the corporate affairs and the shareholders are unable to break the deadlock. To obtain a court-ordered dissolution Cox must also prove that irreparable injury to the corporation is being suffered or is threatened. None of these facts are present. The fact that there is bitterness and animosity does not constitute a deadlock of the management. The corporation is continuing to increase its earnings at a 10 percent per year rate. Courts are loath to grant an order for an involuntary dissolution even if there is a serious deadlock, provided the corporation continues to be a viable economic entity.

Chapter Three

Microeconomics with Strategy Emphasis

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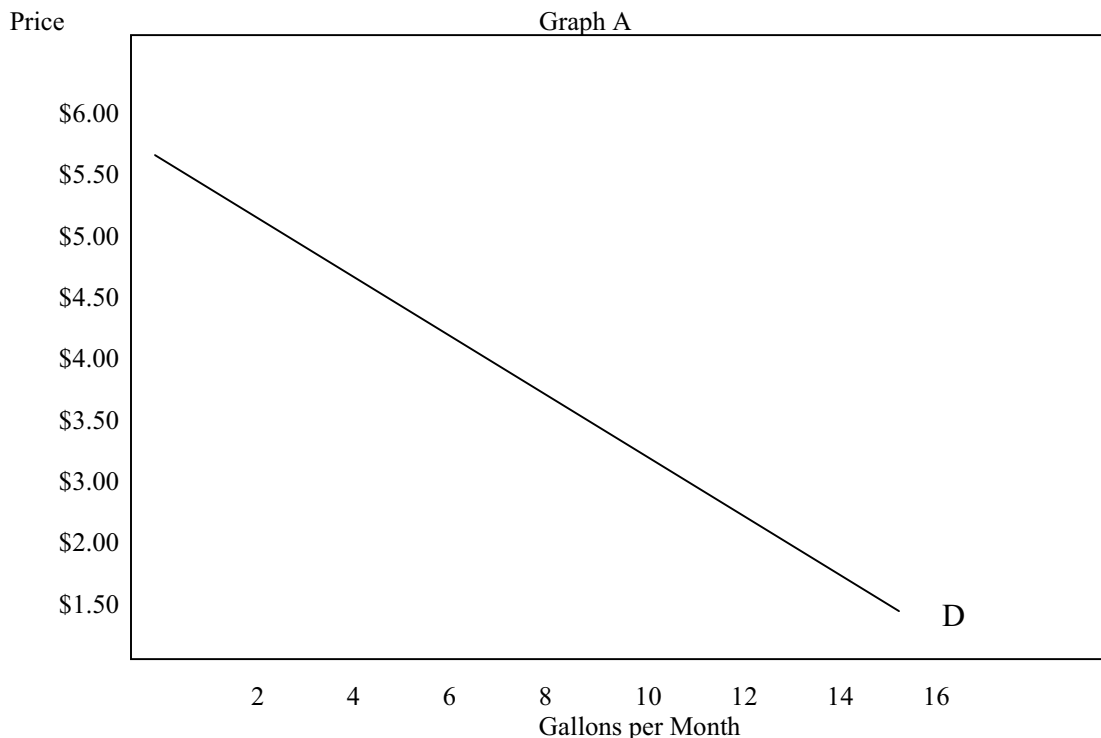
Chapter Three

Microeconomics with Strategy Emphasis

Market Influences on Business Strategies, Including Selling, Supply Chain, and Customer Management Strategies

An understanding of micro-economics (the economics of the firm) starts with an understanding of the demand and supply curves and their intersection to determine the equilibrium price. Let us review by examining a family's demand curve for a commodity product such as milk in a regional marketing area such as New York City. The graph below illustrates the demand curve.

Demand Curve for Milk in New York City



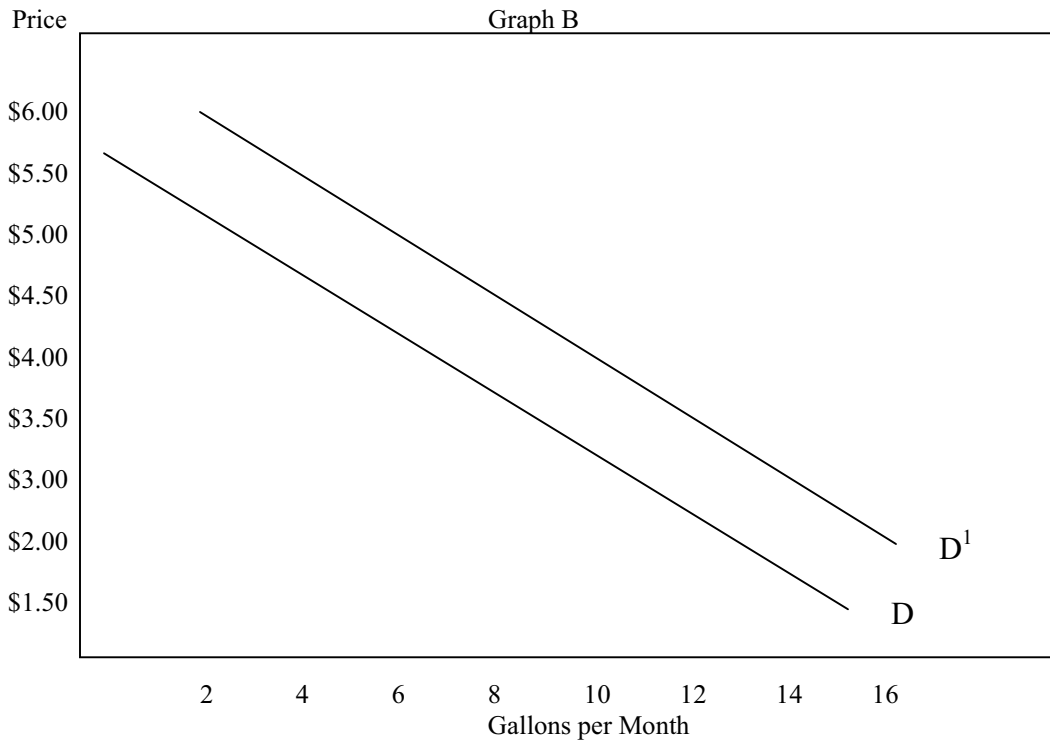
The demand curve in graph A, above is illustrated by the line that is downward sloping to the right (D). The demand curve is downward sloping because of the law of diminishing marginal utility. The law of diminishing marginal utility recognizes that the total satisfaction derived from the consumption of milk (or any good) will initially increase as more of the good is consumed and then total satisfaction will start to diminish. The diminishing total satisfaction is reflected in the demand curve in that as the quantity per month increases, the consumer will be willing to pay less for the next additional unit of the good. The consumer might be willing to pay \$3.50 per gallon for 8 gallons of milk per month, but would only be willing to purchase the ninth gallon of milk per month at some price less than \$3.50 per gallon.

From a strategic viewpoint, businesses seek to shift the demand curve to the right in order to sell a larger quantity at the same price or the same quantity at a higher price. The various ways that a demand curve might shift to the right are the following:

1. Increase in the number of consumers
2. A change in tastes in favor of the good
3. Increase in the price of substitutes
4. An increase in the income of consumers

A shift in the demand curve should be contrasted with a change in quantity demanded on the same demand curve. A **shift in the demand curve** to the right signals that at each price point the consumer is willing to buy a larger quantity of the good. On the other hand, a **change in quantity demanded** refers to a change in demand on a particular demand curve. A change in quantity demanded may be illustrated by reference to graph A. Given the demand curve in graph A, a change in price from \$3.50 per gallon to \$3.00 per gallon will result in an increase in quantity demanded from 8 gallons per month to 10 gallons per month. Thus, the term “change in quantity demanded” does not refer to a situation in which the demand curve has shifted. Graph B below illustrates the shift in the demand curve from D to D¹.

Demand Curve for Milk in New York City



When you contrast demand curve D with demand curve D¹ it is clear that for all price points the quantity demanded is greater for demand curve D¹ than it is for demand curve D. That demand curve shift to the right could have been caused by any of the four causes mentioned earlier.

The slope of the demand curve is of particular importance from a strategic perspective. Demand curves tend to be either elastic or inelastic. An elastic demand curve suggests that a small percentage change in price will result in a larger percentage change in quantity demanded. Using the demand curve in graph A, we can calculate the **price elasticity of demand** for the situation in which the price declines from \$3.50 per unit to \$3.00 per unit. Graph A shows that the quantity of 8 gallons is associated with the \$3.50 per gallon price and the quantity of 10 gallons is associated with the \$3.00 price. The coefficient of the price elasticity of demand for that portion of the demand curve is calculated using the following equation:

$$\text{Percentage change in quantity} / \text{Percentage change in price}$$

The decline in price from \$3.50 to \$3.00 results in a \$.50 change in price. That represents the following percentage change in price:

$$\begin{aligned}
 & \$.50 / \text{Average of } \$3.50 \text{ and } \$3.00 = \\
 & \$.50 / \$3.25 = 15.38\%
 \end{aligned}$$

The increase in quantity from 8 gallons (associated with the \$3.50 price) to 10 gallons (associated with the \$3.00 price) represents the following percentage change in quantity demanded:

$$2 \text{ gallon change} / \text{Average of 8 gallons and 10 gallons} =$$

$$2 \text{ gallons} / 9 \text{ gallons} = 22.22\%$$

Therefore the price elasticity of demand is

$$22.2\% \text{ change in quantity} / 15.38\% \text{ change in price} = 1.44$$

Therefore the coefficient of the price elasticity of demand for that price change is 1.44. A coefficient greater than one suggests an elastic demand curve and a coefficient less than one suggests an inelastic demand curve.

It is important to remember that the equation for calculating the coefficient of the price elasticity of demand has the Quantity on the top and the Price on the bottom. To help you remember, think of a man that has his tie tied too tightly. It is so tight that his tongue is hanging out as in Q for quantity. The P (price) represents the tie around his neck.

Inelastic demand is represented by a coefficient of price elasticity of demand that is less than 1. In such a situation the demand curve would tend to be more vertical than the one shown in graph A. The demand curve for coffee would likely be more vertical than the demand curve for milk given that there is more of a tendency for the caffeine in coffee to be slightly addictive. The inelastic demand curve suggests that a large percentage change in price will result in a relatively small percentage change in quantity demanded.

The difference between elastic and inelastic demand may also be examined in terms of the total revenue before and after a price change. In the example in which the price changed from \$3.50 to \$3.00, the quantity changed from 8 gallons to 10 gallons. The revenue associated with the \$3.50 price was \$28 (\$3.50 X 8 gallons) and the revenue associated with the \$3.00 price was \$30 (\$3.00 X 10 gallons). Thus, for this relatively elastic demand curve (in the interval of \$3.50 to \$3.00 per gallon) illustrated in graph A, the decline in price resulted in an increase in revenue by \$2. (\$30- \$28). This focus on revenues permits us to draw the following conclusions concerning the relationship between revenue and price elasticity of demand:

<u>If the demand curve...</u>	<u>and...</u>	<u>then...</u>
Is elastic	Price falls	Revenue increases
Is elastic	Price rises	Revenue decreases
Is inelastic	Price falls	Revenue decreases
Is inelastic	Price rises	Revenue increases

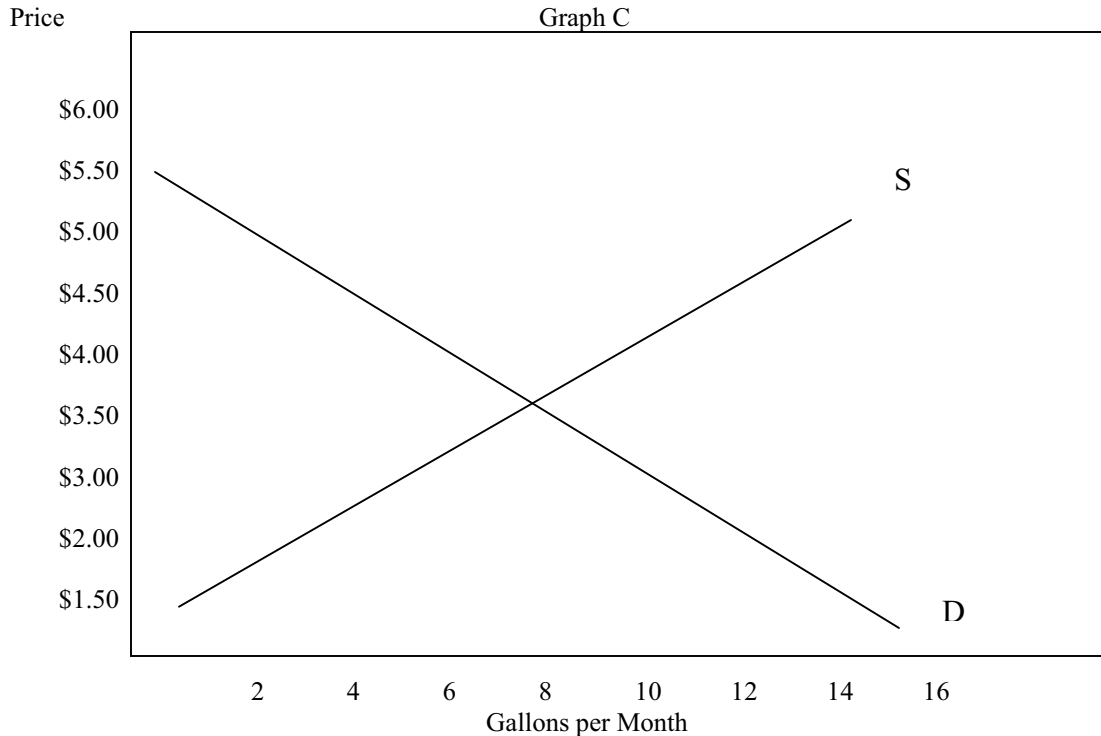
Demand is more elastic for goods that have multiple substitutes and less elastic for goods with relatively few substitutes. A strategy used by many companies is one that attempts to convince potential customers that the company's product is sufficiently differentiated from other products that there is no suitable substitute product. The company is attempting to create a relatively inelastic demand curve for the product. An inelastic demand curve would permit the company to increase price and thus increase revenues. In contrast, an elastic demand curve would result in a decrease in revenues if price were increased.

Demand also tends to be more inelastic in the short run because it takes time to identify suitable substitutes. Thus, the demand for a product tends to be more elastic in the long run than it is in the short run. Thus, a strategy of raising prices to take advantage of a relatively inelastic demand curve in the short run could be counterproductive. The higher prices could attract competitors and the competitors would offer suitable substitute products. In the long run, the demand curve could become elastic because of the increased substitutes. Thus, the exploitation of an inelastic demand curve may only be profitable in the long term if the company can sustain a competitive advantage.

High value products are more likely to have elastic demand curves than are low value products. For high value products, such as automobiles, the consumer is more likely to shop around for substitute products because the potential savings associated with "shopping around" are likely to be great. On the other hand, the potential savings from shopping around for low value products, such as candy bars, is not nearly as great.

Now that we have dealt with the demand curve, it is time to turn to the supply curve. The supply curve slopes upward and to the right as shown in graph C. The intersection of the demand and supply curves is at a price of \$3.50 and a quantity of 8 gallons per month. The intersection of the demand and supply curves is called the “price equilibrium point” and it determines the price at which the good will be sold and the quantity which will be sold.

Demand and Supply Curves for Milk in New York City



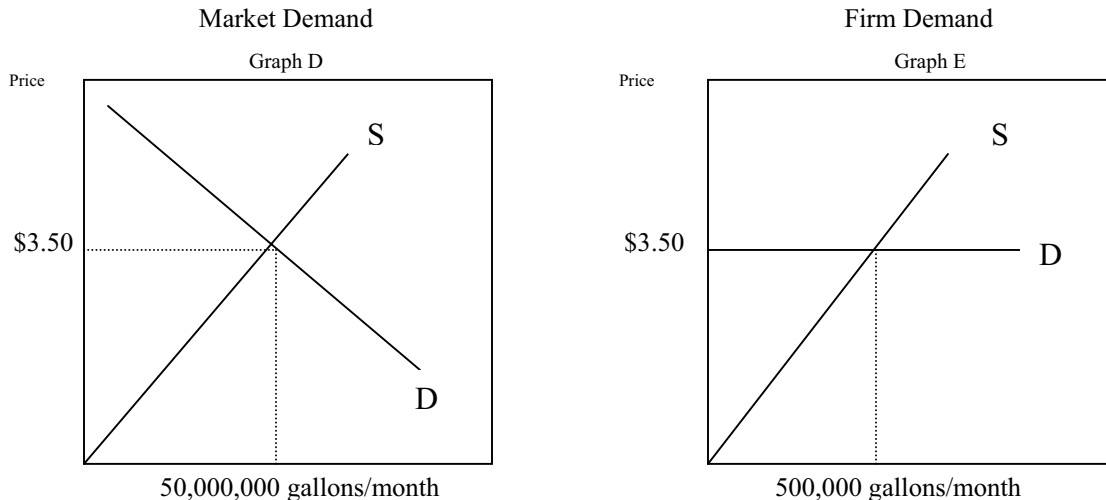
The supply curve slopes upward as a result of the tendency for marginal costs to increase as the quantity produced increases. The law of diminishing returns is the basis on which marginal costs increase. Given a fixed amount of production resources (equipment and buildings), the addition of increments of labor will produce diminishing returns. Those diminishing returns translate into higher marginal costs as the quantity increases. Thus, with increasingly higher marginal cost, a producer would only be induced to produce a larger quantity if the price of the product were sufficiently high. The price has to exceed the marginal cost of the next unit of product produced in order to induce the producer to supply a larger quantity.

Just like demand curves, supply curves may shift to the right or to the left. A shift to the right implies that a larger quantity will be supplied for every price point on the supply curve. A shift to the left implies that a smaller quantity will be supplied for every price point on the supply curve. Listed below are the various causes of a supply curve shift:

- Price of input resources – if the price of input resources declines, the marginal cost declines and the supply curve will shift to the right. A larger quantity will be offered at each price point.
- Number of suppliers – if the number of suppliers increases, the supply curve will shift to the right. In this case, the marginal cost has not changed but more is supplied because of a greater number of suppliers.

- Improved technology – if the technology is improved, the productivity of the supplier is likely to improve. This improved technology will reduce the marginal cost and result in the producer supplying a larger quantity for each price point.
- Prices of other goods – If the company is capable of producing product A and product B and the price of product B decreases, the company may curtail the production of product B and shift production to product A. In such a situation, the supply curve for product A will shift to the right as the company seeks to utilize the unused capacity occasioned by curtailing the production of product B.
- Changes in taxes – A decrease in excise taxes on a product, such as tobacco products, is the same as a reduction in the marginal cost of the product. The result is that a reduction in taxes will cause the supply curve to shift to the right. An increase in excise taxes will cause the supply curve to shift to the left to represent a reduction in the quantity supplied for each price point.

Now that we have dealt with both demand and supply curve, we can discuss the markets in terms of demand, supply, and the interaction of demand and supply in a **perfectly competitive market**. So far we have spoken of the price elasticity of demand as being relatively elastic or relatively inelastic. It is common for a firm's demand curve for a particular good to be perfectly elastic even though the demand curve for the entire market for the good to be relatively inelastic. This is particularly the case when there is no opportunity for product differentiation and there are many sellers and many buyers. The graphs D and E, below, will illustrate that situation:



From the perspective of the firm (Graph E), the demand curve is the same as the marginal revenue curve because the milk producer can sell all that he or she can produce at the \$3.50 per gallon price. The information presented immediately below provides evidence that the demand curve faced by the firm in a perfectly competitive market is horizontal at the unit price point (\$3.50 per unit) and that the horizontal demand curve also is same as the marginal revenue curve.

<u>Units Sold</u>	<u>Selling Price Per Unit</u>	<u>Total Revenue</u>	<u>Average Revenue</u>	<u>Marginal Revenue</u>
500,000	\$3.50	\$1,750,000.00	\$3.50	
500,001	\$3.50	\$1,750,003.50	\$3.50	\$3.50
500,002	\$3.50	\$1,750,007.00	\$3.50	\$3.50
500,003	\$3.50	\$1,750,010.50	\$3.50	\$3.50

The average revenue is the total revenue divided by the number of units sold. The marginal revenue is the change in the total revenue as the number of units sold changes.

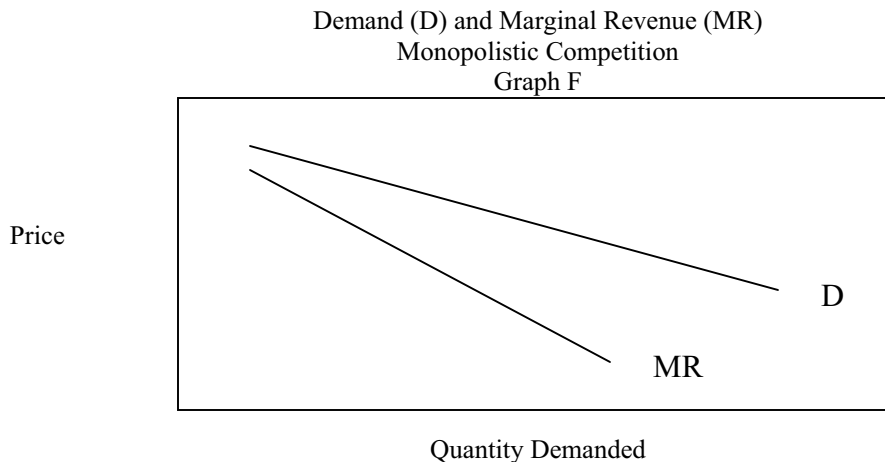
Graph D represents the aggregate market for milk in the New York City region for one month. It represents the sum of the demand for all persons in the New York City region (the earlier Graph A represented the demand curve for

only one family to keep it simple). In graph D, the supply curve also shows the aggregate marginal cost curve for all producers of milk in the New York City region.

Graph E illustrates the demand curve faced by a single producer that sells milk in the New York City region. Notice that the demand curve for that firm is a **horizontal demand curve**. The horizontal demand curve implies a perfectly elastic demand curve. If the producer increases the price from \$3.50 per gallon to \$3.60 per gallon, he or she will not be able to sell any milk at all. The purchasers of milk will merely purchase their milk from a competitor who continues to sell it at \$3.50 per gallon. If the producer reduces the price from \$3.50 per gallon to \$3.40 per gallon, the quantity supplied, as reflected on the firm's supply curve, would fall to some quantity less than the 500,000 gallons associated with the \$3.50 per gallon price. Thus, a reduction in price would reduce quantity sold and reduce revenues. That implies lower profits. No producer faced with a perfectly elastic demand curve would dare to attempt to sell at a price lower than the market's equilibrium price. That is so because the producer can sell all that he or she can produce at the market price.

In such a situation, the producer can improve profits only by lowering the marginal cost of production and shifting the supply curve to the right. In such a situation the producer would be selling a larger quantity at the same \$3.50 per gallon price and the marginal cost of the last unit produced of the larger quantity would still be no more than \$3.50 per gallon. Profits would increase! The **market structure** just described for a commodity type product (such as milk) is regarded as "**perfect competition.**"

There are other situations (**monopolistic competition market structure**) in which there are many buyers and a relatively few sellers. The fast food industry is an example of an industry with a market structure that could be described as monopolistic competition. In monopolistic competition the demand curve and the marginal revenue curve are not identical. This is so because selling a larger quantity of the product can only be accomplished if the price of the product is reduced (unlike a commodity product in a perfectly competitive market). This divergence of the demand and marginal revenue curves is illustrated in Graph F, below:



Notice that the marginal revenue (MR) curve is beneath the demand (D) curve, suggesting that increasing quantities will be demanded only at a lower price. That was not the case with perfect competition. In perfect competition, the firm could sell all that it could produce at the same price. Thus, in perfect competition, the demand curve and the marginal revenue curve were identical.

Firms in an industry characterized by monopolistic competition rely on differentiation among products or among suppliers of the products in order to earn more profits. In monopolistic competition, there are fewer suppliers with each supplier possessing a modest amount of market power as a result of reduced competition. Many retail businesses, personal service businesses, and manufacturing businesses seek to differentiate their product by creating customer loyalty through special services, quality, and location. Customer loyalty will cause customers to patronize the company without seeking substitutes for the product. In retailing, location is a powerful form of differentiation. The retailer with the better location is likely to have a steeper slope to the demand curve than a retailer who has a less desirable location.

The less-than-perfect competition is also caused by barriers to entry into the industry and by the fact that some companies in the industry may have something unique to offer in terms of product, service, or location. Barriers to entry such as patents, licenses, franchising, proprietary information, and size of investment, will often limit the number of competitors in the industry. Another barrier to entry and source of product differentiation is advertising. Advertising and product branding are used by businesses to create and maintain product differentiation and create a subtle barrier to entry.

Successful product differentiation and the creation of barriers to entry give the business more monopoly power than other competitors. That monopoly power will manifest itself in terms of a relatively more vertical demand curve (less price elasticity of demand).

A Supply chain management system is a means by which firms have been successful in lowering their logistics, materials management, and distribution costs. **Supply chain management** systems refer to improvement of a company's processes for production and delivery services, purchasing, invoicing, inventory management, and distribution. The advent of e-commerce has created opportunities for the linking of the various companies in a supply chain from the production of raw materials to the delivery of the finished product to the consumer. A properly designed supply chain system creates opportunities for reduction of inventory management costs (possibly less spoiled product), reduced clerical costs (computer matching of invoice with receiving report), improved scheduling of timely delivery of the product to avoid out-of-stock situations (improved logistics) at all levels (producer, processor, wholesaler, and retailer), and improved customer service as a result of the producer being more responsive to the consumer's product demands.

- The lower cost occasioned by the successful implementation of supply chain management will lower the marginal cost of the products produced. The lower marginal cost will shift the firm's supply curve to the right and encourage the business to produce more of the product or service at the same price.
- Thus, the successful implementation of the supply chain management system has the promise of increasing profits to the firm until such time as all in the industry implement supply chain management systems. Of course, as more and more firms in the industry successfully implement supply chain management systems, the market's aggregate marginal cost will decline and the market's supply curve will shift to the right. With no change in the demand curve, the result will be lower prices and larger quantities produced as the market arrives at a new equilibrium price for the product. The ultimate result will be a reduction in the price to the consumer as a result of competition among producers.

Chapter Three

Microeconomics with Strategy Emphasis

Multiple Choice Questions¹

1. The demand for a good or service depends on all the following factors EXCEPT:
 - a. The cost to produce it.
 - b. The price of the item.
 - c. The tastes of consumers.
 - d. The prices of substitute and complementary goods.

2. Which of the following statements concerning the relationship of the quantity demanded or supplied with price is (are) correct?
 - (1) The quantity supplied varies inversely with price.
 - (2) The quantity demanded varies directly with price.
 - a. (1) only
 - b. (2) only
 - c. Both (1) and (2)
 - d. Neither (1) nor (2)

3. According to economic theory, which of the following statements is correct?
 - a. A price in excess of the equilibrium price would lead to a shortage of supply.
 - b. A price in excess of the equilibrium price would lead to an excess of demand.
 - c. An equilibrium price can be disrupted by a rightward or leftward shift of the supply or demand curve.
 - d. An equilibrium price is the price at which all consumers are able to buy as much as they want.

4. A shift in the supply curve downward and to the right, with the demand curve unchanged, will lead to which of the following results?
 - (1) An increase in the equilibrium price
 - (2) A decrease in the equilibrium quantity
 - a. (1) only
 - b. (2) only
 - c. Both (1) and (2)
 - d. Neither (1) nor (2)

5. When building contractors decide *not* to build on speculation but only when a contract to build is executed, it is a signal that wage inflation may be causing a rise in building costs. One may conclude from this scenario that:
 - a. The supply curve will remain static as wage inflation increases demand.
 - b. The quantity of new homes demanded will decrease, prices will rise, and the supply curve will shift to the left.
 - c. The supply curve will shift downward but prices will rise.
 - d. The quantity of homes built will decrease along with the price of housing.

6. Supply Chain Management systems rely upon which of the following?
 - a. Many suppliers.
 - b. Frequent competitive bidding.
 - c. Cooperation between purchasing and suppliers.
 - d. Short-term contracts.

7. If both the supply and the demand for a good increase, the market price will
 - a. rise only in the case of an inelastic supply function.
 - b. fall only in the case of an inelastic supply function.
 - c. not be predictable with only these facts.
 - d. rise only in the case of an elastic demand function.

8. The sum of the average fixed costs and the average variable costs for a given output is known as
 - a. long-run average cost.
 - b. average product.
 - c. total cost.
 - d. average total cost.

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9. In any competitive market, an equal increase in both demand and supply can be expected to always
- increase both price and market-clearing quantity.
 - decrease both price and market-clearing quantity.
 - increase market-clearing quantity.
 - increase price.
10. A perfectly inelastic supply curve in a competitive market
- means the equilibrium price must be zero.
 - says the market supply curve is horizontal.
 - exists when firms cannot vary input usage.
 - can only exist in the long run.
11. Government price regulations in competitive markets that set maximum or ceiling prices below the equilibrium price will in the short run
- cause demand to decrease.
 - cause supply to increase.
 - create shortages of that product.
 - have no effect on the market.
12. In competitive product markets, equilibrium price in the long run is
- a fair price all consumers can afford.
 - set equal to the total costs of production.
 - set equal to the total fixed costs of production.
 - set equal to the marginal costs of production.
13. In the theory of demand, the marginal utility per dollar of a product
- increases when consumption expands.
 - decreases when consumption expands.
 - is used to explain why demand curves are vertical.
 - explains why short-run supply curves are upward sloping.
14. In the short run, the supply curve in a competitive market shows a positive relationship between price and quantity supplied because
- a higher price causes an increase in demand so the market stays in equilibrium.
 - of the law of diminishing returns.
 - as the size of a business firm increases, price must rise.
 - increases in output imply a shift in consumer preferences allowing a higher price.
15. Because of the existence of economies of scale, business firms may find that
- each additional unit of labor is less efficient than the previous unit.
 - as more labor is added to a factory, increases in output will diminish in the short run.
 - increasing the size of a factory will result in lower average costs.
 - increasing the size of a factory will result in lower total costs.
16. Economic markets that are characterized by monopolistic competition have all of the following characteristics EXCEPT
- one seller of the product.
 - economies or diseconomies of scale.
 - heterogeneous products.
 - downward-sloping demand curves for individual firms.
17. When markets are perfectly competitive, consumers
- must search for the lowest price for the products they buy.
 - have goods and services produced at the lowest cost in the long run.
 - must choose the brands they buy solely on the basis of informational advertising.
 - do not receive any consumer surplus unless producers choose to overproduce.
18. The manner in which cartels set and maintain price above the competitive market price is to
- avoid product differentiation in order to decrease demand for the product.
 - advertise more so market demand increases.
 - encourage the introduction of higher-priced substitute products.
 - require cartel members to restrict output.
19. In a competitive market for the labor where demand is stable, if workers try to increase their wage,
- employment must fall.
 - labor supply must increase.
 - government must set a maximum wage below the equilibrium wage.
 - firms in the industry must become smaller.

20. In microeconomics, the distinguishing characteristic of the long run on the supply side is that
- only supply factors determine price and output.
 - only demand factors determine price and output.
 - firms are not allowed to enter or exit the industry.
 - all inputs are variable.
21. Any business firm that has the ability to control price of the product it sells
- faces a downward-sloping demand curve.
 - does not have any entry or exit barriers in its industry.
 - has a supply curve that is horizontal.
 - has a demand curve that is horizontal.
22. The competitive model of supply and demand predicts that a surplus can only arise if there is a
- maximum price above the equilibrium price.
 - minimum price below the equilibrium price.
 - technological improvement in the means of production.
 - minimum price above the equilibrium price.
23. If a group of consumers decide to boycott a particular product, the expected result would be
- an increase in the product price to make up lost revenue.
 - a decrease in the demand for the product.
 - an increase in product supply because of increased availability.
 - that companies in the industry would experience higher economic profits.
24. In markets that are imperfectly competitive, such as monopoly and monopolistic competition, firms produce at an output where
- price equals marginal cost.
 - marginal cost equals marginal revenue.
 - total revenue is maximized.
 - price equals average cost.
25. Price tends to fall in competitive markets when there is a(n)
- increase in demand for the product.
 - decrease in quantity demanded of the product.
 - decline in available labor.
 - increase in interest rates.
26. Product demand becomes more elastic the
- greater the number of substitute products available.
 - greater the consumer income.
 - greater the elasticity of supply.
 - higher the input costs.
27. If a product's demand is elastic and there is a decrease in price, the effect will be
- a decrease in total revenue.
 - no change in total revenue.
 - a decrease in total revenue and the demand curve shifts to the left.
 - an increase in total revenue.
28. The movement along the demand curve from one price-quantity combination to another is called a(n)
- change in demand.
 - shift in the demand curve.
 - change in the quantity demanded.
 - increase in demand.
29. In the pharmaceutical industry where a diabetic must have insulin no matter what the cost and where there is no other substitute, the diabetic's demand curve is BEST described as
- perfectly elastic.
 - perfectly inelastic.
 - elastic.
 - inelastic.
30. Monopolistic competition is characterized by
- a relatively large number of sellers who produce differentiated products.
 - a relatively small number of sellers who produce differentiated products.
 - one or two companies producing similar products.
 - a relatively large number of sellers who produce a standardized product.
31. If a product has a price elasticity of demand of 2.0, the demand is said to be
- perfectly elastic.
 - perfectly inelastic.
 - elastic.
 - inelastic.

32. Demand for a product tends to be price inelastic if
- the product is considered a luxury item.
 - few good complements for the product are available.
 - few good substitutes are available for the product.
 - people spend a large share of their income on the product.
33. Which one of the following is NOT a key assumption of perfect competition?
- Firms sell a homogeneous product.
 - Customers are indifferent about which firm they buy from.
 - The level of a firm's output is small relative to the industry's total output.
 - Each firm can price its product above the industry price.
34. A market with many independent firms, low barriers to entry, and product differentiation is BEST classified as
- a monopoly.
 - a natural monopoly.
 - monopolistic competition.
 - an oligopoly.
35. Which one of the following would cause the demand curve for a commodity to shift to the left?
- A rise in the price of a substitute product.
 - A rise in average household income.
 - A rise in the price of a complementary commodity.
 - A rise in the population.
36. An increase in the market supply of beef would result in a(n)
- decrease in the quantity of beef demanded.
 - increase in the quantity of beef demanded.
 - decrease in the demand for beef.
 - increase in the price of pork.
37. The law of diminishing marginal utility states that
- marginal utility will decline as a consumer acquires additional units of a specific product.
 - total utility will decline as a consumer acquires additional units of a specific product.
 - consumers' wants diminish with the passage of time.
 - as marginal utility diminishes, the price of a specific product decreases proportionally.
38. The local video store's business increased by 12 percent after the movie theater raised its prices from \$6.50 to \$7.00. This is an example of
- substitute goods.
 - superior goods.
 - complementary goods.
 - public goods.

Chapter Three

Microeconomics with Strategy Emphasis

Answers to Multiple Choice Questions

1. Answer (a) is the correct answer. The cost to produce an item is a determinant of the supply curve for the item. Answer (b) is not correct because the price of the item is a determinant of the demand for an item. Answer (c) is not correct because the tastes of the consumer is a determinant of demand. Answer (d) is not correct because the prices of substitute and complementary goods is a determinant of demand.

2. Answer (d) is the correct answer. The quantity supplied varies directly with price and the quantity demanded varies indirectly with price. Answer (a) is not correct because the quantity supplied varies directly with price. Answer (b) is not correct because the quantity demanded varies indirectly with price. Answer (c) is not correct because the quantity supplied varies directly with price and the quantity demanded varies indirectly with price.

3. Answer (c) is the correct answer. An equilibrium price can be disrupted by any change in the supply and or the demand curve. Answer (a) is not correct because such a price would lead to a surplus. Answer (b) is not correct because such a price would lead to a deficiency in demand. Answer (d) is not correct because an equilibrium price leads to an equality of the quantities demanded and supplied, not necessarily (or even likely) a complete satisfaction of consumer demand for the good or service.

4. Answer (d) is the correct answer. A downward and to the right shift in the supply curve with no change in the demand curve will result in a lower price and a larger equilibrium quantity. Answer (a) is not correct because a downward and to the right shift in the supply curve with no change in the demand curve will decrease the equilibrium price. Answer (b) is not correct because a downward and to the right shift in the supply curve with no change in the demand curve will result in an increase in the equilibrium quantity. Answer (c) is not correct because a downward and to the right shift in the supply curve with no change in the demand curve will result in a lower price and a larger equilibrium quantity.

5. Answer (b) is the correct answer. The supply curve will shift to the left, the demand curve will remain unchanged, prices will increase and the quantity demanded will decline. Answer (a) is not correct because the supply curve will shift to the left and speculative homes are no longer built. Answer (c) is not correct because a downward shift in the supply curve would suggest an increased supply at all price points (contrary to the removal of speculative homes) and an increased supply would imply a reduction in price. Answer (d) is not correct because the supply curve will shift to the left as speculative homes are no longer constructed. That shift in the supply curve with no change in the demand curve will result in an increase in price.

6. Answer (c) is the correct answer. Supply Chain Management systems are based on purchasers and suppliers working together under long-term contracts to reduce the cost of the product or service and also to reduce the cost of the delivery and documentation. Answer (a) is not correct because under Supply Chain Management systems purchasing managers establish partnerships with one or few suppliers. Answer (b) is not correct because under Supply Chain Management systems the purchasing manager and the supplier enter into a long-term contract to induce the supplier to participate as a partner with the purchaser. Answer (d) is not correct because in order to establish a partnership between the purchaser and the supplier, there is a need for long-term contracts.

7. (c) is the correct answer. The effect on the market price will only be predictable when the extent of the change in demand or supply is known. That information is not given among the choices. Answer (a) is not correct because the increase in supply is inconsistent with an inelastic supply function. Answer (b) is not correct because the increase in supply is inconsistent with an inelastic supply function. Answer (d) is not correct because the increase in demand is inconsistent with an inelastic demand function.

8. (d) is the correct answer. Explicit costs are of two types—fixed costs and variable costs. The sum of the average fixed costs and average variable costs is equal to the average total costs. Answer (a) is not correct because the long-run average cost includes opportunity costs. Answer (b) is not correct because average product is the total physical product divided by the number of units of the factor employed. Answer (c) is not correct because the total cost is the sum of the total variable costs and the total fixed costs.

9. (c) is the correct answer. The market clearing quantity is the quantity purchased which leaves no frustrated consumers. If the increase in both demand and supply were equal, that increase in supply would be purchased and there would be no frustrated consumers. Thus, the quantity purchased would increase. Answer (a) is not correct because it is not likely that the price would increase because the supply increased. Answer (b) is not correct because it is not likely that the price would decrease because the demand increased. Answer (d) is not correct because both demand and supply increase equally.

10. (c) is the correct answer. A perfectly inelastic supply curve is a vertical line; and it implies that a change in price will not impact the quantity offered in the market. That would be the case where firms cannot vary input usage. Answer (a) is not correct because an equilibrium price of zero would mean that it is a free good. Answer (b) is not correct because a horizontal supply curve is used to represent a perfectly elastic supply curve, not an inelastic one. Answer (d) is not correct because a perfectly inelastic supply curve is more likely to occur in the short run, than in the long run. In the long run, producers may be able to adjust to lower or higher demand for the product.

11. (c) is the correct answer. If the maximum price is set below the equilibrium price, the supply will not be sufficient to meet the demand. Thus, there will be a shortage of the product. Answer (a) is not correct because demand is independent of supply. Answer (b) is not correct because supply will not increase if the market-clearing price cannot be realized. Answer (d) is not correct because regulations that set minimum prices are likely to have an impact on the market in most situations.

12. (d) is the correct answer. In a competitive market, the forces of demand and supply will, in the long run, cause price to equal marginal cost. If price is higher than marginal cost, additional production will be forthcoming. If price is lower than marginal cost, producers will quit producing. Answer (a) is not correct because a competitive market cannot assure a fair price that all consumers can afford. The disposable income of the consumers dictates whether or not they can afford the product at the equilibrium price. Some will be able to afford it and some will not. Answer (b) is not correct because a price set equal to the total cost of production fails to recognize that the total cost should be divided by the number of units produced. Answer (c) is not correct because a price set equal to the total fixed cost of production fails to recognize that the total fixed cost should be divided by the total number of units produced. Even then, the variable costs per unit would be ignored.

13. (b) is the correct answer. The principle of diminishing marginal utility states that additional utility declines as quantity consumed increases. Answer (a) is not correct because the principle of diminishing marginal utility states just the opposite is true. One tires of something the more he or she has of it. Answer (c) is not correct because a vertical demand curve implies that the demand remains unchanged as price changes. That is contrary to the principle of diminishing marginal utility. Answer (d) is not correct because it implies that marginal utility increases as supply increases. Utility is independent of supply.

14. (b) is the correct answer. In the short run the addition of variable inputs to fixed resources yields additional output; but the amount of additional output diminishes as more variable inputs are used. Thus, as price increases, the amount of product supplied will increase until the marginal cost is equal to the marginal revenue. Answer (a) is not correct because a higher price does not usually cause an increase in demand. The increase in demand is what would likely cause a higher price. Answer (c) is not correct because as the size of the business firm increases, the price must fall if the demand remains unchanged. Answer (d) is not correct because increases in supply do not always imply a shift in consumer preference; it could be caused by the entry of a new producer in pursuit of excess profits.

15. (c) is the correct answer. Economies of scale are declines in long-run average costs that are caused by increased plant size. Answers (a) and (b) are not correct because they describe the law of diminishing returns. Answer (d) is not correct because increasing the size of the factory might lower average costs, but it will not lower total costs.

16. (a) is the correct answer. Monopolistic competition is characterized by a market in which a large number of firms sell differentiated products. Answer (b) is not correct because firms in a market characterized by monopolistic competition are faced with economies and dis-economies of scale. Answer (c) is not correct because the monopolistic competition market is characterized by a set of goods that are differentiated but have a large number of close substitutes. Answer (d) is not correct because the monopolistic competition market is faced with a downward sloping demand curve. As the price of the product declines, more will be demanded.

17. (b) is the correct answer. In a purely competitive market, in the long run, an increase in market demand will cause the price to rise. Economic profit will result, and new firms will enter the industry in response to this profit. As new firms enter, the market supply increases causing price to fall to the point at which all firms are earning zero economic profit. Answer (a) is not correct because consumers will be able to buy the product at the same price from several sources. Answer (c) is not correct because informational advertising plays a limited role in perfectly competitive markets because there is little opportunity for product differentiation. Answer (d) is not correct because there is no such thing as overproduction because all of the production will be cleared at the market price.

18. (d) is the correct answer. Cartels control price by restricting output. The oil cartel is an example. The OPEC countries restrict output to increase price. Answer (a) is not correct because cartels do not seek to decrease demand. Answer (b) is not correct because advertising is not likely to influence demand for the homogeneous product that the cartel produces. Answer (c) is not correct because there is no evidence that cartels encourage the introduction of higher-priced substitute products. The effect of a cartel might be the introduction of lower-priced substitute products, e.g., natural gas substituted for oil.

19. (a) is the correct answer. If supply remains unchanged and there is a concerted effort to increase price, demand will fall and unemployment will increase. This is one of the arguments against the minimum wage. Answer (b) is not correct because it is possible that there is no additional labor supply available to respond to the increased wage. Answer (c) is not correct because there is no economic law that says that the government must interfere. Answer (d) is not correct because the firms may choose to substitute capital for labor in order to maintain production.

20. (d) is the correct answer. In the long run, the firm has the opportunity to change the factors of production. The firm can expand or contract in response to changes in consumer demand. Thus, in the long run all inputs are variable. Answer (a) is not correct because in the long run the demand factors play a role in determining price and output. Answer (b) is not correct because supply factors play a role in determining price and output. Answer (c) is not correct because in the long run firms are assumed to enter and exit the industry.

21. (a) is the correct answer. A business that has the ability to control the price of the product it sells is a monopolistic firm. In such a situation the firm faces the market demand curve because the firm is the single seller in the market. Market demand curves have a negative slope (downward sloping). Answer (b) is not correct because such a firm is monopolistic; and industries in which monopolism exists have barriers to entry and exit. Answer (c) is not correct because in the case of a monopolist, one cannot predict the supply curve without knowing the demand curve. In a sense a monopolist has no supply curve. Answer (d) is not correct because in a monopolistic industry, the firm faces the market demand curve and market demand curves have negative slopes (downward sloping).

22. (d) is the correct answer. A minimum price above the equilibrium price will cause more to be produced than can be cleared by the price. This excess uncleared production is a surplus. Answer (a) is not correct because a maximum price above the equilibrium price means that the price will be set by the market at the equilibrium price. At the equilibrium price there will be no surplus. Answer (b) is not correct because the minimum price below the equilibrium price means that the price will be set by the market at the equilibrium price. At the equilibrium price there will be no surplus. Answer (c) is not correct because if there is technological improvement in the means of production the average cost would decrease and a new supply curve would result. Given no change in the demand curve, the equilibrium price would be adjusted downward; but there would be no surplus.

23. (b) is the correct answer. A boycott would decrease the demand at all price levels and result in a shift in the demand curve to the left. Answer (a) is not correct because a lower quantity would be sold at the same price. Answer (c) is not correct because there would be no increase in availability. The supply curve would be dictated by the cost of production, not by the demand curve. Answer (d) is not correct because the quantity demanded would be lower at every price level with no change in the cost of production. Thus, profits would decline.

24. (b) is the correct answer. The monopolist produces a small output and charges a higher price than a perfectly competitive firm. The monopolist is encouraged to stop production when the marginal cost equals marginal revenue. Answer (a) is not correct because the firm in a perfectly competitive market will produce an output where price equals marginal cost and marginal cost and average cost will be equal. Answer (c) is not correct because the maximization of total revenue does not pay proper attention to the role that cost plays in influencing supply. Answer (d) is not correct because the firm in a perfectly competitive market will produce an output where price equals average cost and average cost and marginal cost will be equal at the output level.

25. (b) is the correct answer. Given an unchanging supply, the price of a product in a competitive market will decline as there is a decline in the demand for the product. Answer (a) is not correct because an increase in the demand for the product will cause a higher price. Answer (c) is not correct because when there is a decline in the available labor, the costs go up and the price is likely to rise. Answer (d) is not correct because as the interest rates increase, the costs will increase and the price is likely to rise.

26. (a) is the correct answer. Product demand elasticity refers to the extent to which demand will change in response to changes in price. If there are substitute products, the demand will be more elastic than if there were no substitute products. With substitute products, if the price goes up, the consumer will merely shift demand to the substitute products. Answer (b) is not correct because when the consumer has greater income, there is decreasing marginal utility. The decreasing marginal utility causes the consumer to be less likely to reduce demand as the price increases. Thus, increased income would result in less elasticity of demand. Answer (c) is not correct because the elasticity of supply is independent of the elasticity of demand. Answer (d) is not the correct answer because higher input costs might influence the price, but it will not influence the elasticity of demand.

27. (d) is the correct answer. Because the product's demand is elastic, the revenue effect of the increase in quantity is greater than the revenue effect of the decrease in price. The result is a net increase in total revenue. Answer (a) is not correct because when the product's demand is elastic, the revenue effect of the increase in quantity is greater than the revenue effect of the decrease in price. Thus, the total revenue would not decrease. Answer (b) is not correct because when the product's demand is elastic, the revenue effect of the increase in quantity is greater than the revenue effect of the decrease in price. Thus, the total revenue would not stay the same. Answer (c) is not correct because elasticity of demand refers to changes in the quantity demanded as price changes. It does not refer to shifts in the demand curve.

28. (c) is the correct answer. This highlights an important distinction between a change in the quantity demanded and a shift in the demand curve. When the change is along a specific demand curve, as it is in this question, it is referred to as a change in the quantity demanded. In contrast, if the demand curve itself changes, that is referred to as a shift in the demand curve. Answer (a) is not correct because a change in demand would imply a shift in the demand curve, not movement along the existing demand curve. Answer (b) is not correct because a shift in the demand curve means a movement of the demand curve in response to a change in the demand. Answer (d) is not correct because an increase in demand would imply a shift in the demand curve, not movement along the existing demand curve.

29. (b) is the correct answer. A product that is a necessity is often characterized by inelastic demand. Thus, the quantity demanded does not change much in response to a change in the price of the product. Answer (a) is not correct because the term "perfectly elastic" implies that there would be a major change in the quantity demanded for any small change in the price. Answer (c) is not correct because the term "elastic" implies that there would be a significant change in the quantity demanded for any small change in the price. Answer (d) is not correct because of the phrase in the question which states "no matter what cost." That phrase suggests that this answer, although a good answer, may not be the best answer.

30. (a) is the correct answer. Monopolistic competition is the situation in which there are a large number of sellers who can, for a short period of time, create a monopoly by differentiating their product. Answer (b) is not correct because monopolistic competition is not characterized by a relatively small number of sellers. An oligopoly has a small number of sellers. Answer (c) is not correct because that choice describes a monopoly or an oligopoly. Answer (d) is not correct because that choice describes perfect competition.

31. (c) is the correct answer. A price elasticity of 2.0 suggests that the percentage change in quantity will be twice the percentage change in price. Such a change is not perfectly elastic; but it is elastic. Answer (a) is not correct because perfectly elastic demand would have a price elasticity of demand of infinity. Answer (b) is not correct because perfectly inelastic demand would have a price elasticity of demand of zero. Answer (d) is not correct because a price elasticity of less than 1 is characteristic of inelastic demand.

32. (c) is the correct answer. If there are few substitutes and the product is considered a necessity, then any increase in price will not have much of an impact on demand. Answer (a) is not correct because luxury items are items for which there are a significant number of substitutes. Thus, if the price goes up, the demand for the item might be

significantly reduced. Answer (b) is not correct because complements are products that are sold in conjunction with the main product. The fact that there is a complement for the product has no real impact on the elasticity of demand for the primary product. Answer (d) is not correct because such a generalization is not warranted. This is true because some people spend a large portion of their income on necessities and some people spend a large portion of their income on luxuries. The statement may be more true for those who spend a large portion of their income on necessities.

33. (d) is the correct answer. If a firm in a perfectly competitive industry were to price its product above the industry price, the firm would sell nothing. This is true because the consumer could buy an identical product at a lower price just down the street. Answer (a) is not correct because it is a choice that describes a characteristic of perfect competition. Answer (b) is not correct because it is a choice that describes a characteristic of perfect competition. Answer (c) is not correct because it is a choice that describes a characteristic of perfect competition.

34. (c) is the correct answer. Monopolistic competition is characterized by many firms in a situation in which there can be product differentiation for a short period of time. An example is the fast food industry. One fast food chain will develop a new concept; and the others will soon be copying that concept. Answer (a) is not correct because a monopoly usually has only one firm. Answer (b) is not correct because a natural monopoly is a monopoly which is created because the economies of scale restrict competitors. An example would be power generation. Answer (d) is not correct because an oligopoly usually has only a few firms.

35. (c) is the correct answer. Complementary products are products that are sold in conjunction with the primary product. If the primary product is a razor, then the complementary product would be razor blades. Answer (a) is not correct because a rise in the price of a substitute product would cause the demand curve for this product to shift to the right. This would indicate a larger quantity demanded at all price levels. Answer (b) is not correct because a rise in the average household income would tend to shift the demand curve to the right indicating a larger quantity demanded at all price levels. Answer (d) is not correct because a rise in population would tend to shift the demand curve to the right indicating a larger quantity demanded at all price levels.

36. (b) is the correct answer. The supply curve would shift to the right and the demand curve would remain unchanged. Thus, there would be a decline in the price and an increase in the quantity demanded. Answer (a) is not correct because the supply curve would shift to the right and the demand curve would remain unchanged. Thus, there would be an increase in the quantity demanded. Answer (c) is not correct because the supply curve would shift to the right and the demand curve would remain unchanged. There would be no impact on the demand curve. However, there would be a larger quantity demanded as the price falls. Answer (d) is not correct because the supply curve would shift to the right and the demand curve would remain unchanged. The result should be a decrease in the price of pork as the demand shifts from pork (a substitute for beef) to beef because of the lower price of beef.

37. (a) is the correct answer. Marginal utility will decline as a consumer acquires additional units of a specific product. As we consume more, the utility of the last unit consumed is less than the utility of the previous unit consumed. Answer (b) is not correct because even though marginal utility will decline, total utility will continue to increase until marginal utility becomes zero or negative. Answer (c) is not correct because consumers' wants may not diminish with the passage of time. Further, the law of diminishing utility deals with a finite time period. Answer (d) is not correct because as the marginal utility diminishes, the relationship between supply and demand as reflected in the demand curve will change; however, the price of a specific product may only be assessed in terms of its relationship with quantity demanded. That relationship is reflected in the demand curve.

38. (a) Substitute goods are goods that are regarded as substitutes for each other. One purchases either one or the other. Answer (b) is not correct because there is no economic term such as "superior good." There is a distinction between a normal good and an inferior good. A normal good is one for which demand increases as income increases. An inferior good is one for which demand falls as income increases. Answer (c) is not correct because complementary goods are goods that are often acquired together. An example is razors and razor blades. Answer (d) is not correct because public goods are goods that are nonrival in consumption and not subject to exclusion. Nonrival means the good is not used up through consumption. Exclusion means that non-payers can be prevented from consuming the good. An example of a public good might be sunshine.

Chapter Four

Business Cycles

BUSINESS CYCLES AND REASONS FOR
BUSINESS FLUCTUATIONS 4-1

- Recession Phase
- Deflation

EXPANSION, OR RECOVERY, PHASE 4-2

- Peak Phase
- Unemployment

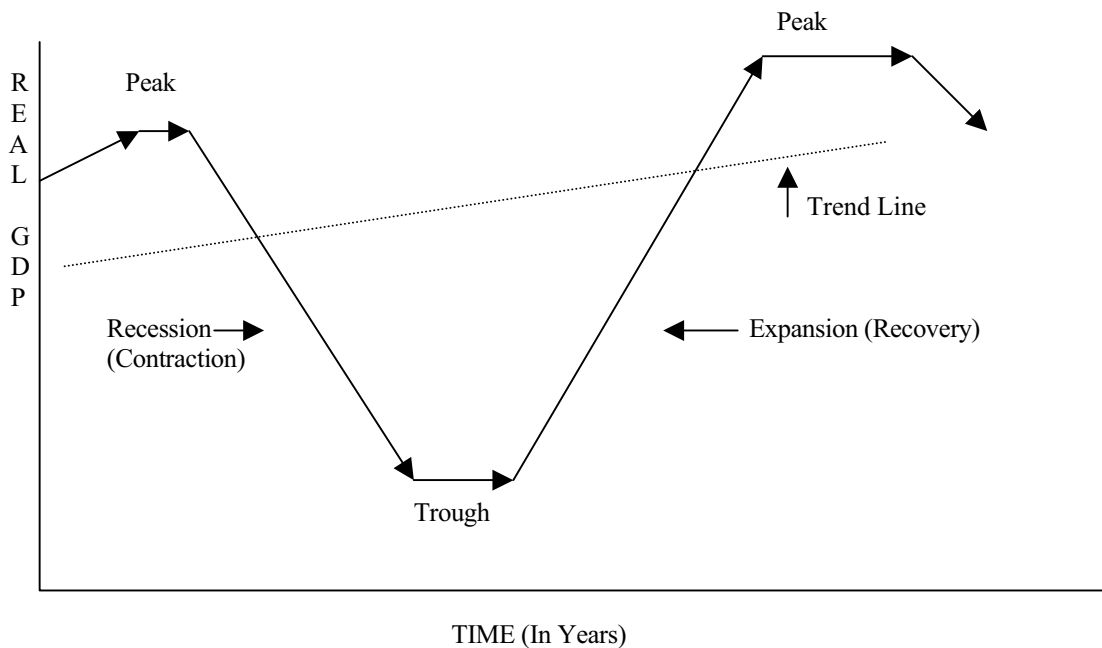
Chapter Four

Business Cycles

Business cycles and reasons for business fluctuations

The **business cycle** refers to the continual ebb and flow of economic activity. No two cycles are exactly the same. The business cycle is characterized by changes in real Gross Domestic Product (GDP) and other measures such as the rate of unemployment and the rate of inflation.

There are four phases of the business cycle. The intensity and duration of these phases will vary from one business cycle to the next. The four phases are 1. **peak**, 2. **recession (contraction)**, 3. **trough**, and 4. **expansion (recovery)** as shown in the graph below:



The **length of the business cycle** is measured by the time elapsed between the peaks.

The **recession phase** is characterized by increasing unused productive capacity associated with increasing unemployment. The increasing unemployment causes reduced spending and the reduced spending in conjunction with higher levels of unused capacity usually results in a decline in output (GDP). A decline in GDP for two or more quarters constitutes a recession.

However, because many prices are inflexible in terms of price reduction, the price level is likely to decline only if the recession is intense and of long duration. Recessions of high intensity and long duration are called depressions.

Deflation is the opposite of inflation in that during a period of deflation the price levels decline. If price levels are declining, consumers tend to postpone spending in the hopes of paying lower prices in the future. Therefore, governments go to great lengths to avoid deflation by means of monetary and fiscal policy.

When the economy has realized its lowest level of production (GDP) in the business cycle, a **trough** has been reached. The trough phase in the business cycle is never recognized until the expansion phase is well under way. Thus, the trough phase can only be recognized in retrospect. What appears to be a trough phase may only be a slight pause in a continuing recession phase. The trough phase may last only a short time or it could persist for a long period.

The **expansion, or recovery, phase** is characterized by decreasing unemployment, greater utilization of productive capacity and an increase in real GDP. As the expansion phase progresses, the shrinking unused capacity and declining number of unemployed make it more likely that there will be inflationary pressures. As the expansion phase progresses, spending occasioned by the higher level of employment will increase. That increased spending, when considered against a backdrop of actual production creeping closer to productive capacity may lead to more aggressive pricing by producers. The higher levels of income increase demand for products but the diminishing unused productive capacity limits the supply. The result is increased inflationary pressure.

It is during the expansion, or recovery, phase that businesses are likely to make capital expenditures to increase their productive capacity. However, these capital expenditure decisions are not likely to be made until the expansion, or recovery, phase is well under way.

The **peak phase** is the period during which the economy has reached its highest level of production (GDP) in the business cycle. At the peak, there is often full employment and the level of real output is near the productive capacity. It is at this point that there is likely to be significant upward pressure on price levels as demand increases and supply is restricted by diminished available capacity.

The economy of the United States of America has experienced several recessions in the past fifty years. The duration of those recessions varied from approximately one-half year to two years. The trend however, when measured by Gross Domestic Product, has been consistently upward. That upward growth is suggested by the trend line in the graph shown above.

Although we have explained the phases of business cycles in terms of the level of unused productive capacity and the level of unemployment, the more basic cause of business cycles is **total spending** as measured by GDP. If total spending declines, production is curtailed to avoid building inventory in the face of declining demand for the products. The result is that unemployment increases and income falls. When the total spending increases, higher levels of production become possible, employees are hired, and incomes rise. However, as the economy nears full employment and the factories approach full productive capacity, further increases in production output become more difficult to achieve. At this point, further increases in total spending will put pressure on prices as consumers earning higher incomes bid for the limited quantity of goods available.

Business cycles affect all sectors of the economy. However, all sectors are not affected to the same extent. Companies producing capital goods and consumer durable goods are greatly affected by business cycles. These companies produce high priced items that require considerable thought and analysis prior to purchase. In the case of **capital goods** (buildings, trucks, machinery and technology), considerable analysis precedes the decision to purchase. That analysis includes a projection of future cash flows and the calculation of the internal rate of return. If the internal rate of return is not sufficiently high, the purchase of the capital asset will be postponed. In the case of **consumer durable goods** (automobiles, appliances, furniture and houses), the consumer gives considerable thought to an acquisition. The consumer is unlikely to make the purchase unless the consumer has a genuine need and has the income necessary to support the purchase.

On the other hand, **service goods** (haircuts, doctor visits and entertainment) provided by service industries and **non-durable consumer goods** (toiletries, food, and fuel) are purchased without much analysis. These purchases are not likely to be postponed until the expansion, or recovery, phase of the business cycle. It is true that the quantity and quality of services and non-durable consumer goods demanded will decline during a recession phase; however, the decline will not be nearly as severe as for capital goods and consumer durable goods.

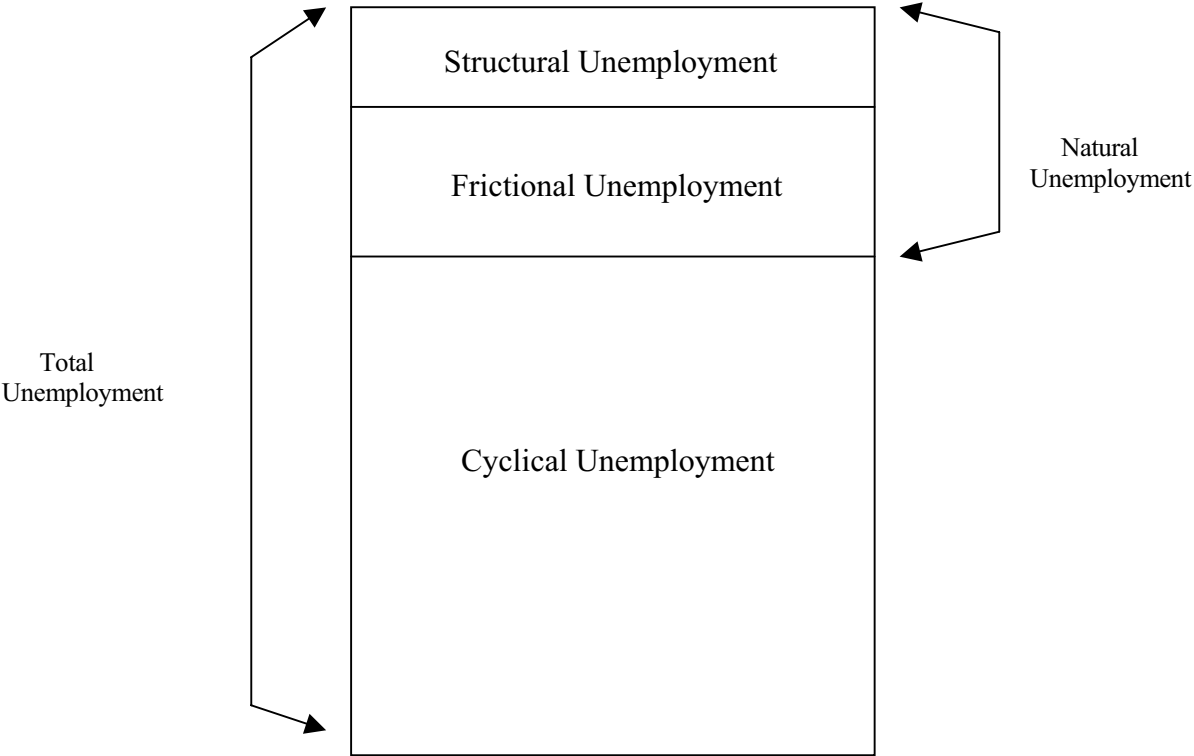
In considering all aspects of the business cycle, it is necessary to discuss the various measures of unemployment. The **natural rate of unemployment** is the long-run rate of unemployment that would exist even if there were no **cyclical unemployment**. It is important to consider that the unemployment rate cannot reach zero. People are always switching jobs, getting fired, or quitting. As a result, when the real unemployment rate is equal to the natural rate of unemployment, the economy is deemed to be at **full employment**. Therefore, when the economy is at full employment, there are still unemployed people.

The **frictionally unemployed** are capable workers who are “between jobs” and have not been matched-up with their next job yet. The frictionally unemployed also include those young people who are looking for their first job. Frictional unemployment is caused by limited information, unfortunate timing, and geographical separation between potential

employer and potential employee. The **structurally unemployed** include workers who have skills that do not match up to the skills necessary for a particular job. Structural unemployment typically results from technological changes in the workplace.

Another type of unemployment is **cyclical unemployment**. Cyclical unemployment is caused by fluctuations in the business cycle. Cyclical unemployment usually occurs when the GDP begins to decline and the economy begins to go into the a recession.

The graph below shows the relationship that exists among these various types of unemployment:



Chapter Four - Business Cycles

Multiple Choice Questions

1. During the recession phase of a business cycle,
 - a. the purchasing power of money is likely to decline rapidly.
 - b. the natural rate of unemployment will increase dramatically.
 - c. potential national income will exceed actual national income.
 - d. actual national income will exceed potential national income.
2. The trough of a business cycle is generally characterized by
 - a. shortages of essential raw materials and rising costs.
 - b. increasing purchasing power and increasing capital investments.
 - c. rising costs and an unwillingness to risk new investments.
 - d. unused productive capacity and an unwillingness to risk new investments.
3. Recurring upswings and downswings in an economy's real Gross Domestic Product over time are called:
 - a. recessions.
 - b. business cycles.
 - c. output yo-yos.
 - d. total product oscillations.
4. In the United States, business cycles have occurred against a backdrop of a long-run trend of:
 - a. declining unemployment.
 - b. stagnant productivity growth.
 - c. rising real Gross Domestic Product
 - d. rising inflation.
5. The immediate determinant of the volume of output and employment is the:
 - a. composition of consumer spending.
 - b. ratio of public goods to private goods production.
 - c. level of total spending.
 - d. size of the labor force.
6. In which of the following industries or sectors of the economy is output likely to be most strongly impacted by the business cycle?
 - a. military goods.
 - b. producer's durables (machinery or equipment).
 - c. textile products (clothing).
 - d. agricultural commodities (wheat or corn).
7. During a prolonged recession, we would expect output to fall the most in:
 - a. the health care industry.
 - b. the clothing industry.
 - c. agriculture.
 - d. the construction industry.
8. The phase of the business cycle in which real Gross Domestic Product declines is called:
 - a. the peak.
 - b. a recovery.
 - c. a recession.
 - d. the trough.
9. The phase of the business cycle in which real Gross Domestic Product is at a minimum is called:
 - a. the peak.
 - b. a recession.
 - c. the trough.
 - d. a recovery.
10. Market economies have been characterized by:
 - a. occasional instability of employment and price levels.
 - b. uninterrupted economic growth.
 - c. persistent full employment
 - d. declining populations.
11. The production of durable goods varies more than the production of nondurable goods because:
 - a. durable purchases are non-postponable.
 - b. durable purchases are postponable.
 - c. the producers of nondurables have monopoly power.
 - d. Producers of durables are highly competitive.
12. A recession is a period in which:
 - a. cost-push inflation is present.
 - b. potential domestic output falls.
 - c. demand-pull inflation is present.
 - d. real domestic output falls.
13. The natural rate of unemployment is:
 - a. higher than the full-employment rate of unemployment.
 - b. lower than the full-employment rate of unemployment.
 - c. that rate of unemployment occurring when the economy is operating at its full potential.
 - d. found by dividing total unemployment by the size of the labor force.

14. If the unemployment rate is 9 percent and the natural rate of unemployment is 5 percent, then the:
- frictional unemployment rate is 5 percent.
 - cyclical unemployment rate and the frictional unemployment rate together are 5 percent.
 - cyclical unemployment rate is 4 percent.
 - natural rate of unemployment will eventually increase.
15. The natural rate of unemployment:
- is fixed over time.
 - is found by adding the cyclical and structural unemployment rates.
 - may change from one decade to another.
 - cannot be changed through public policy.
16. The natural rate of unemployment is the:
- unemployment rate experienced at the depth of a depression.
 - full-employment unemployment rate.
 - unemployment rate experienced by the least-skilled workers in the economy.
 - unemployment rate experienced by the most-skilled workers in the economy.
17. Cyclical unemployment results from:
- deficiency of aggregate spending.
 - the decreasing relative importance of goods and the increasing relative importance of services in the economy.
 - the everyday dynamics of a free labor market.
 - technological change.
18. Structural unemployment:
- is also known as frictional unemployment.
 - is the main component of cyclical unemployment.
 - is said to occur when people are waiting to be called back to previous jobs.
 - may involve a locational mismatch between unemployed workers and job openings.
19. The type of unemployment associated with a recession is called:
- frictional unemployment.
 - structural unemployment.
 - cyclical unemployment.
 - seasonal unemployment.
20. Which of the following constitute the unemployment occurring at the natural rate of unemployment?
- frictional and cyclical unemployment.
 - structural and frictional unemployment.
 - cyclical and structural unemployment.
 - frictional, structural, and cyclical unemployment.
21. All the following are characteristic of the recessionary stage of the business cycle EXCEPT:
- It eventually leads to a trough.
 - Unemployment levels rise.
 - Prices fall more rapidly than economic activity falls.
 - Output levels decline.
22. If John's expectations of sustained economic growth are correct, which of the following correctly pairs an investment vehicle with an economic scenario, likely to exist under the growth assumption, that would make the investment attractive?
- Short-term debt instruments: sustained economic growth will cause a substantial increase in interest rates.
 - Real estate: sustained economic growth will induce high inflation.
 - Common stock: sustained economic growth will entail a neutral fiscal and monetary policy, but firms with prospects for consistent earnings growth will prosper.
 - Cyclical common stocks: sustained economic growth will cause interest rates to fall, thus spurring demand.
23. Which of the following combinations of investments would be best for the investor in an environment of high inflation?
- Common stock in companies with large holdings of oil, precious metals, or land
 - Collectibles
 - Short-term liquid assets like U.S. Treasury bills and money market funds.
 - Common stock of public utility companies.
- (1) and (2) only
 - (3) and (4) only
 - (1), (2), and (3) only
 - (2), (3), and (4) only
24. Which of the following combinations of investments would be best when the economy is undergoing deflation?
- Long-term bonds rated AA or higher
 - Long-term bonds rated CC or lower
 - Common stocks of firms with sizeable financial leverage
 - Short-term U.S. Treasury bills
- (2) and (3) only
 - (1) and (4) only
 - (1), (2), and (4) only
 - (1), (3), and (4) only

25. David believes that we are moving into a period of deflation. If David's expectations concerning deflation are correct, which of the following correctly pairs an investment vehicle with an appropriate logic?

- a. Savings and loan common stocks: deflation will cause savings and loans to lend at higher rates.
- b. Precious metals: deflation will cause these assets to increase in value.
- c. Long-term, high-quality bonds: deflation will cause interest rates to decrease.
- d. Short-term bonds: deflation will cause short-term interest rates to increase.

26. Tracy is concerned that inflation will increase soon. Given an inflationary economic environment, which one of the following investment vehicles would be most appropriate for Tracy to purchase?

- a. Automotive stocks: inflation will cause cyclical stocks to increase in value.
- b. Precious metals: inflation will cause these assets to increase in value.
- c. Long-term bonds: inflation will cause interest rates to increase.
- d. Short-term bonds: inflation will cause interest rates to decrease.

27. If an investor held long-term U.S. Treasury bonds currently, the investor would most likely sell them and hold money if he or she believed that interest rates will:

- a. Rise far above present levels.
- b. Not change from present levels.
- c. Fluctuate up and down within a narrow range.
- d. Fall below present levels.

Chapter Four – Business Cycles

Answers to Multiple Choice Questions

1. Answer (c) is the correct answer. Productive capacity would support a higher national income than the actual income during a recession phase. Answer (a) is not correct because in a recession phase there is not likely to be inflation and it is inflation that causes the purchasing power of money to decline. Answer (b) is not correct because the natural rate of unemployment tends not to change. It represents the sum of the frictionally and the structurally unemployed. Answer (d) is not correct because potential national income is related to productive capacity. During a recession the actual production (GDP) is less than the productive capacity.

2. Answer (d) is the correct answer. At the trough, there is considerable unused capacity. However, because a trough is not recognized until the expansion is clearly under way, investments are postponed until it is clear the expansion is under way. Answer (a) is not correct because there are unlikely to be shortages of essential raw materials when production is at a reduced level. Likewise, in a trough, inflationary pressures are unlikely. Answer (b) is not correct because increased investment is not likely until it is clear that an expansion phase is under way. When the economy is in a trough, it is not clear how long it will remain that way. Answer (c) is not correct because rising costs are not usually present until the economy is well into the expansion phase as actual production approaches capacity and incomes increase as a result of reduced unemployment.

3. Answer (b) is the correct answer. Business cycles are measured by changes in GDP. Answer (a) is not correct because recessions are caused only by the downswings in GDP. Answer (c) is not correct because “output yo-yos” is a nonsensical answer. Answer (d) is not correct because the answer is a nonsensical answer.

4. Answer (c) is the correct answer. The trend line of GDP has been a growth trend line. Answer (a) is not a correct answer because the natural rate of unemployment tends to remain unchanged or even increase as the population grows. Answer (b) is not correct because the trend has been an increase in GDP and GDP reflects increases in production. Answer (d) is not correct because the trend in inflation has been declining as GDP increases.

5. Answer (c) is the correct answer. Total spending has the greatest influence on production and higher production causes higher employment which will also increase spending. Thus, fiscal policy often increases government spending or decreases taxes in order to jump-start the economy. Answer (a) is not the correct answer because the volume of output is influenced by government, business, and consumer spending, not just consumer spending. Answer (b) is not correct because private goods and public goods production is part of the volume of output rather than a determinant of the volume of output. Answer (d) is not the correct answer because the size of the labor force is of no consequences to the volume of output. The size of the labor force is not the same as the unemployment rate; and it is the unemployment rate that is a determinant of the volume of output.

6. Answer (b) is the correct answer. Durable goods are the types of goods that require considerable thought and analysis prior to the decision to invest. If the economy is in a recessionary phase, decision makers are faced with increasing unused capacity. They are not likely to invest in durable goods under those conditions. Answer (a) is not correct because the purchase of military goods is not likely to be influenced by the business cycle. Decisions about military acquisitions are more likely to be influenced by geopolitical considerations. Answer (c) is not correct because clothing is considered a necessity and its purchase is not the result of considerable thought and analysis. Answer (d) is not correct because agricultural commodities are considered necessities and their purchase is not preceded by considerable thought and analysis.

7. Answer (d) is the correct answer. The construction industry is based on business decisions that require considerable thought and analysis. During a prolonged depression, there would be excess capacity and businesses are not likely to expand capacity through construction until such time as the expansionary phase is well under way. Answer (a) is not correct because the health care industry is based on purchases that are considered a necessity. Answer (b) is not correct because the clothing industry is based on purchases that are considered a necessity. Answer (c) is not correct because the agriculture industry is based on purchases that are considered a necessity.

8. Answer (c) is the correct answer. A recession is characterized as a period during which production is measured by GDP declines for two or more quarters in a row. Answer (a) is not correct because the peak is the high point in the business cycle when there is neither increase or decrease. Answer (b) is not the correct answer because the recovery

phase is the phase in which GDP increases. Answer (d) is not correct because the trough is the low point in the business cycle when there is neither increase or decrease.

9. Answer (c) is the correct answer. The trough is the lowest point in the business cycle. Answer (a) is not correct because the peak is the highest point in the business cycle. Answer (b) is not correct because a recession is defined as an economy which has been in decline for two or more quarters. Answer (d) is not correct because a recovery is defined as an economy that has been through the trough and GDP is increasing.

10. Answer (a) is the correct answer. Market economies are always subject to economic cycles. Economic cycles are characterized by instability of employment levels and price levels. Planned economies are not nearly as inclined toward instability. Answer (b) is not correct because, even though market economies tend to have long-term growth, the growth is frequently interrupted by business cycles. Answer (c) is not correct because market economies will always have frictional and structural unemployment (natural level of unemployment) plus cyclical unemployment because of business cycles. Answer (d) is not correct because market economies attract workers from other economies and thus, the population of countries with market economies tends to increase.

11. Answer (b) is the correct answer. Durable goods, as contrasted to consumer goods, are postponable. Durable goods include machinery, transportation equipment, and building construction. Answer (a) is not correct because it is nondurable goods (consumer goods such as toiletries, food, and clothing) that are regarded as non-postponable. Answer (c) is not correct because the producers of nondurable goods (toiletries, food, and clothing) operate in nearly perfectly competitive markets where there are many buyers and many sellers. Answer (d) is not correct because the producers of durable goods tend to operate in a market where there are many buyers but few sellers.

12. Answer (d) is the correct answer. Real domestic output, as measured by real GDP, falls during a recession. In fact, a recession is defined as a period in when GDP declines for two or more consecutive quarters. Answer (a) is not correct because no form of inflation is likely to be present when spending, employment, and GDP are declining as in a recession. Answer (b) is not correct because potential domestic output remains unchanged during a recession. Potential domestic output is measured by the productive capacity of the economy. Answer (c) is not correct because no form of inflation is likely to be present when spending, employment, and GDP are declining as in a recession.

13. Answer (c) is the correct answer. The natural rate of unemployment is what is left after the cyclical unemployment has been eliminated. That elimination of the cyclical unemployment is likely to occur when the economy is at the peak of a business cycle. Answer (a) is not correct because the natural rate of unemployment is essentially the same as the full-employment rate of unemployment. Answer (b) is not correct because the natural rate of unemployment is essentially the same as the full-employment rate of unemployment. Answer (d) is not correct because the answer is a nonsensical answer.

14. Answer (c) is the correct answer. The unemployment rate is the sum of the natural rate of unemployment plus the cyclical unemployment rate. Answer (a) is not correct because the natural rate of unemployment is the sum of the frictional unemployment rate and the structural unemployment rate. Answer (b) is not correct because the unemployment rate is the sum of the cyclical unemployment rate and the natural rate of unemployment. Answer (d) is not correct because one cannot draw conclusions about the increase or decrease of the natural rate of unemployment by knowing only the unemployment rate and the natural rate of unemployment. Changes in the natural rate of unemployment are gradual and they are related to changes in society.

15. Answer (c) is the correct answer. The natural rate of unemployment is likely to change from one decade to the next as a result of societal changes such as demographic changes and other societal changes. Answer (a) is not correct because the natural rate of unemployment is likely to change to reflect societal changes. Answer (b) is not correct because the natural rate of unemployment is the sum of the frictional unemployment and the structural unemployment. Answer (d) is not correct because the natural rate of unemployment is influenced by societal changes.

16. Answer (b) is the correct answer. The natural rate of unemployment is the rate of unemployment that is experienced when there is no cyclical unemployment. Answer (a) is not correct because at the depth of a depression there would be considerable cyclical unemployment in addition to the always present natural rate of unemployment. Answer (c) is not correct because the unemployment rate of the least-skilled workers in the economy is not ordinarily measured. Answer (d) is not correct because the unemployment rate of the most-skilled workers in the economy is not ordinarily measured.

17. Answer (a) is the correct answer. Aggregate spending impacts GDP and a deficiency in aggregate spending will tend to reduce GDP. A reduction in GDP will result in cyclical unemployment. Answer (b) is not correct because if the decreasing GDP related to goods is offset by the increasing GDP related to services, there is not likely to be any increase in cyclical unemployment. Answer (c) is not correct because it is the natural rate of unemployment that results from the everyday dynamics of a free labor market. Answer (d) is not the correct answer because structural unemployment is caused by technological change.

18. Answer (d) is the correct answer. Structural unemployment is related to geographical separation between the location of the worker and the location of the job opening. Answer (a) is not correct because structural unemployment and frictional unemployment are components of the natural rate of unemployment. Answer (b) is not correct because structural unemployment is a component of the natural rate of unemployment. Answer (c) is not correct because people waiting to be called back to their previous jobs are classified as the frictionally unemployed.

19. Answer (c) is the correct answer. Cyclical unemployment is caused by declining GDP and declining GDP is associated with a recession. Answer (a) is not correct because frictional unemployment is a component of the natural rate of unemployment and the natural rate of unemployment is not likely to change in response to a recession. Answer (b) is not correct because structural unemployment is a component of the natural rate of unemployment and the natural rate of unemployment is not likely to change in response to a recession. Answer (d) is not correct because seasonal unemployment is unemployment caused by seasonal changes rather than changes in GDP.

20. Answer (b) is the correct answer. The natural rate of unemployment is the sum of structural unemployment and frictional unemployment. Answer (a) is not correct because cyclical unemployment is added to the natural rate of unemployment to obtain total unemployment. Answer (c) is not correct because structural unemployment is an element of the natural rate of unemployment but cyclical unemployment is not. Answer (d) is not correct because frictional, structural and cyclical unemployment, taken together, constitute total unemployment.

21. Answer (c) is the correct answer. Economic activity, when measured by GDP, falls but prices are not likely to fall quite as rapidly. Prices tend to be rather “sticky” in a recession. Answer (a) is not correct because a recession will eventually lead to a trough. Answer (b) is not correct because unemployment rises in a recession. Answer (d) is not correct because output levels, when measured by GDP, decline during a recession.

22. Answer (c) is the correct answer. During a period of sustained economic growth, the economy is growing within a desirable range of possible growth rates, enabling government policy to adopt a neutral posture. Firms capable of generating consistent earnings growth will be good investments during a period when moderate inflation is the norm. Answer (a) is not correct because as long as growth is sustained, as opposed to breaking away on the upside, there is little reason for the Federal Reserve to tighten money and cause higher interest rates. Therefore there is little advantage in remaining very liquid with short-term instruments. Answer (b) is incorrect because sustained economic growth means economic growth without an unacceptably high inflation rate. Answer (d) is incorrect because interest rates would not be expected to fall, since Federal Reserve policy would be neutral, and loan demand would not be weak under an environment of sustained economic growth.

23. Answer (c) is the correct answer. Investments 1, 2, and 3 are all well suited for an environment of high inflation. Tangible assets such as land, oil, precious metals, and collectibles have traditionally done well during such periods. High inflation is usually accompanied by high interest rates, since the inflation premium in the interest rate expands. During periods of rising interest rates, short-term liquid assets can be reinvested at higher and higher interest rates. Answer (a) is not correct because there is one more type of investment that would also be advantageous. Answer (b) is not correct because public utilities are highly leveraged with debt and the higher interest rates associated with high inflation would cause increasing costs. Answer (d) is not correct because public utilities are highly leveraged with debt and the higher interest rates associated with high inflation would cause increasing costs.

24. Answer (b) is the correct answer. Long-term AAA rated bonds will lock in the higher interest rates of the past, plus insure confidence that the debt will be serviced during the period when bankruptcies are increasing. Short-term U. S. Treasury bills have zero credit risk, and the purchasing power of this investment is increasing as prices for goods and services are falling as a result of deflation. Answer (a) is not correct because long-term bonds rated CC or lower and common stocks of firms with sizeable leverage are dangerous investments in deflation. The bonds risk default and the companies that are highly leveraged could experience a decline in earnings during a deflationary period. Those decreased earnings could make payment of interest on the debt difficult or impossible. Answer (c) is not correct because long-term

bonds rated CC or lower are dangerous investments in deflation. The bonds risk default. Answer (d) is not correct because companies that are highly leveraged could experience a decline in earnings during a deflationary period. Those decreased earnings could make payment of interest difficult or impossible.

25. Answer (c) is the correct answer. Deflation is a period of tepid demand, declining prices of goods and services, declining interest rates, and rising bankruptcies among the weaker firms. Long-term bonds rated AA or higher are good investments in deflationary times. Answer (a) is incorrect because interest rates will be falling. A lender will be unable to lend at higher interest rates. Answer (b) is incorrect because tangible assets such as precious metals will decline in price during a deflationary economy. Answer (d) is incorrect because the economic logic is faulty. Short-term interest rates will decline in a deflationary economy.

26. Answer (a) is the correct answer. If interest rates rise far above the present levels, there will be a sharp drop in the price for bonds now held. By selling and holding cash, the investor could again buy the bonds when the price dropped, avoiding a possible capital loss and pocketing a substantial gain on the transactions. Answer (b) is not correct because holding the bonds will result in declining market price as interest rates increase. Answer (c) is not correct because it is an increase in interest rates that causes the market price of existing bonds to decline. Answer (d) is incorrect because if interest rates fall from present levels, the market value of the bonds would increase; thus, the investor should continue to hold them.

27. Answer (b) is the correct answer. Precious metals are good investments in inflationary periods. Answer (a) is incorrect because inflation causes interest rates to rise, which decreases demand for postponable, durable goods such as automobiles and houses. Answer (c) is incorrect because higher interest rates will cause long-term bond prices to decline. Answer (d) is incorrect because inflation will cause interest rates to increase, not decrease.

Chapter Five

Economic Measures

ECONOMIC MEASURES AND REASONS FOR CHANGES IN THE ECONOMY, SUCH AS INFLATION, DEFLATION, AND INTEREST RATE CHANGES 5-1

 Gross Domestic Product (GDP)

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Chapter Five

Economic Measures

Economic measures and reasons for changes in the economy, such as inflation, deflation, and interest rate changes.

National income accounting is an attempt to measure the economic performance and production of a nation. The accounting results in a hierarchy of measures that are related to each other. We start with **Gross Domestic Product (GDP)**. GDP is the total market value of all final goods and services produced within a nation’s borders during a specified year. GDP even includes the goods that are produced in local factories owned by foreign companies. The value of the good or service is determined by the price paid by the final consumer. By only counting the value paid by the “final consumer,” it helps to avoid the multiple counting of the value of the good as it moves from one stage of production to another.

There are some transactions that are excluded from GDP. GDP excludes all financial and monetary transactions because they are not related to the production of the final good or service. A second-hand sale is one such transaction (example, resale of home). Second-hand sales contribute nothing to the production of goods in the current year. Similarly, financial transactions is the other type of transaction that is excluded. Financial transactions such as veterans benefits, social security benefits, welfare benefits, gifts from one individual to another, and the buying and selling of stocks and bonds are not included in GDP. They are not included because they too are not associated with the payment for something that was produced in the current year.

Even though GDP should include “all” goods and services within an economy, GDP fails to include some items of production that should be included. Homemakers who repair their own roof or who use their own labor to build a garage are producing something, but the value of their labor is not captured in GDP. Likewise, the production of the “underground economy” is not included in GDP. The underground economy, which produces goods like illegal drugs and illegal labor, along with unreported tips by waiters and waitresses, would actually add to the GDP of the economy but are omitted.

There are two basic ways of determining GDP, the **expenditures approach** and the **income approach**. The expenditures approach focuses on totaling the expenditures on goods and services produced while the income approach focuses on totaling all of the income generated by the production of final goods and services. Even though the two approaches yield the same GDP amount, their component parts are very different. The two approaches to calculating GDP are contrasted below:

Expenditures Approach	Income Approach
Personal Consumption Expenditures + Gross Private Domestic Investment + Government Purchases + Net Exports	<u>Total Aggregate Income</u> Wages and Salaries Profits Interest Rents + Indirect Business Taxes + Depreciation + Net Foreign Factor Income (N.F.F.I)

For the **expenditures approach**, the various elements are defined as follows:

- **Personal Consumption Expenditures** – the amount households spend on consumer goods and services during the year.
- **Gross Private Domestic Investment** – the amount businesses spend on adding and replacing fixed assets (capital goods) and improvements plus additions to business inventories. Gross Private Domestic Investment does not include the sale of stocks, bonds, or the resale of business assets.
- **Government Purchases** – the amount that the government spends on goods (office supplies), services (law enforcement), and infrastructure (roads and schools). Government Purchases exclude transfer payments such as social security payments or welfare payments.
- **Net Exports** – the amount equal to total exports minus total imports. Total exports are all the goods and services produced domestically, but sold abroad. Total imports are all goods and services produced abroad but sold domestically.

For the **income approach**, the various elements are defined as follows:

- **Wages and Salaries** – compensation of employees including salaries, wages, and fringe benefits.
- **Profits** – net income of sole proprietors, partners, and other unincorporated businesses. Additionally, profits include the dividends, income taxes, and undistributed profits of corporations.
- **Interest** – earnings from bonds, savings deposits, certificates of deposit, and other debt instruments.
- **Rents** – rent and lease payments less the year’s depreciation on the asset being rented or leased.

The sum of the four income elements listed above (Wages and Salaries, Rents, Interest, and Profits) constitute the **National Income (NI)**. NI is discussed more fully later.

- **Indirect Business Taxes** – Taxes that include excise taxes, sales taxes, business property taxes, and license fees. These taxes are regarded as part of the cost of producing goods and services and are passed on (in whole or in part) to consumers through higher prices.
- **Depreciation** – Depreciation is the capital consumption allowance related to capital goods. This includes the depreciation on business assets and public assets such as bridges and government buildings.
- **Net Foreign Factor Income** – The income earned by foreigners in the domestic economy for their contribution of labor and capital in the production of goods and service minus the income earned by domestic nationals working , or employing their capital , abroad. The Net Foreign Factor Income can be either + or -.
- **Net Domestic Product (NDP)** is the market value of all final goods and services within an economy (GDP) less depreciation (consumption of fixed assets).
- **National Income (NI)**, which has already been discussed, may be determined in another way. NI can be calculated by starting with NDP and subtracting two elements of GDP. Those two elements are indirect business taxes and Net Foreign Factor Income (NFFI). The following illustrates that approach:

Net Domestic Product (NDP) – GDP less Depreciation	XXX,XXX
Subtract Indirect Business Taxes	XXX
Subtract Net Foreign Factor Income	XXX
National Income	<u>XXX,XXX</u>

- **Personal Income (PI)** is the total income received by individuals or households. PI includes amounts that are currently received but not earned (transfer payments such as, social security benefits and pension benefits) and excludes amounts earned but not received (social security contributions, corporate income taxes, and undistributed corporate profits). PI is available for use in consuming goods and services, increasing savings, and paying personal taxes. Starting with NI, PI is calculated as follows:

National Income (NI)	XXX,XXX
Subtract Social Security Contributions	XXX
Subtract Undistributed Corporate Profits	XXX
Subtract Corporate Income Taxes	XXX
<u>Add transfer payments</u>	<u>XXX</u>
Personal Income (PI)	<u>XXX,XXX</u>

- **Disposable Income (DI)** is PI minus personal taxes (income taxes, personal property taxes, and inheritance taxes). DI is the amount of income left after paying personal taxes. DI is available for use in consuming goods and services and increasing savings.

Personal Income (PI)	XXX,XXX
<u>Less Personal Taxes</u>	<u>XXX</u>
Disposable Income (DI)	<u>XXX,XXX</u>

The following summarizes the relationships among GDP, NDP, NI, PI, and DI:

	<u>Billions of some currency</u>
GDP	10,000
Depreciation	<u>- 1,500</u>
NDP	8,500
Indirect Business Taxes	- 500
Net Foreign Factor Income	<u>- 100</u>
NI	7,900
Social Security Contributions	- 800
Corporate Income Taxes	- 400
Undistributed Corporate Profits	- 600
Transfer Payments	<u>+ 1,800</u>
PI	7,900
Personal Taxes	<u>- 1,400</u>
DI	<u>6,500</u>

The general level of product prices tends to change from year to year because of inflation or deflation. GDP that has not been adjusted for price level changes is called the “**Nominal GDP.**” Nominal GDP is based on the “current” price for each final good or service. A GDP amount that has been adjusted for inflation or deflation is called “**Real GDP.**” Real GDP is the sum of final goods and services measured in constant prices (eliminating the influence of price level changes from year to year). Real GDP is the proper measure of actual production changes from year to year because the impact of price level changes has been removed.

In adjusting Nominal GDP to Real GDP, one must divide each year’s Nominal GDP by that year’s price index. Real GDP amounts are comparable from one year to another because they are based on an index that reflects a stable currency from year-to-year. In the United States of America, the price index used to convert Nominal GDP to Real GDP is the **GDP deflator**, a specialized index designed for use with GDP amounts. This specialized GDP index is a very broad index that measures not only consumer goods but also capital goods, goods and services purchased by the government, and goods and services in world trade.

Another pricing index that is used to measure the change in price levels is the **Consumer Price Index (CPI)**. The CPI index is different from the index used with GDP amounts because the GDP index is based upon the actual goods and services produced each year. The CPI index is based on the prices of 364 consumer goods and services

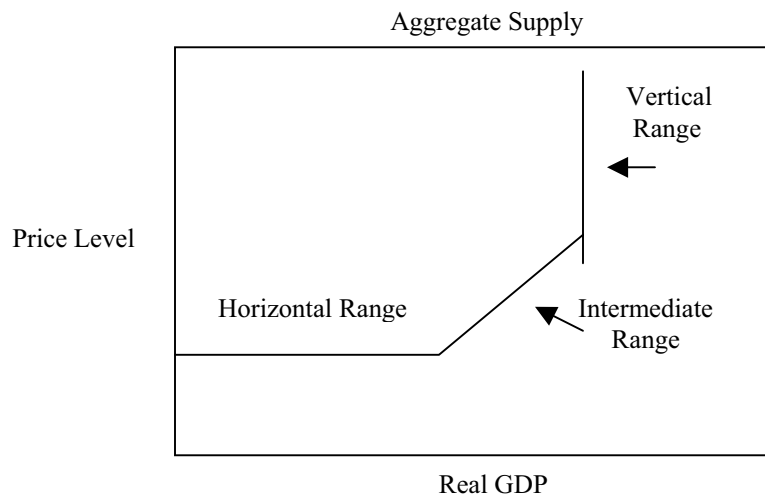
(often called a “basket of goods”). The CPI is a weighted price index such that the proportion of the various goods and services in the basket does not change from year-to-year. Therefore, if 20% of the basket of goods were food items during the period 1993-1995, then food items are considered to make up 20% of the basket of goods in all other years. For example, the CPI was 166.6 in the year 1999 and increased to 172.2 in the year 2000. This means that there was an increase in the cost of the basket of goods from 1999 to 2000, hence inflation. The inflation rate between 1999 and 2000 was 3.4% $((172.2 - 166.6) / 166.6)$. The CPI index is used in the United States of America as a basis for adjusting social security benefits, federal income tax brackets, and selected other contractual payments.

Price indices are used to measure price level changes within an economy. **Inflation** is the increase in the general level of prices in an economy. There are two basic types of inflation – **cost-push inflation** and **demand-pull inflation**. **Cost-push inflation** is an increase in the price level caused by an increase in the cost of the resources used in production. As a result of the increasing cost of resources, the firm has to charge higher prices to offer the same quantity supplied and cover the increased production costs, thus resulting in price level increases. **Demand-pull inflation** is an increase in the price level caused by an increase in demand during a period when supply is limited by capacity. In general, this means that consumers are demanding more goods than the suppliers are supplying. Or in other words, there are “too many dollars chasing too few goods.” This results in the consumer’s bidding higher prices for the limited supply of goods. The end result is that consumers “pull” the price levels up.

The **index of leading economic indicators** is used to foresee changes in GDP. This index includes ten economic variables that, together, provide clues about the future direction of the economy. Because it takes time for economic policies to work, the index provides insight to policy makers about the future direction of the economy. This allows policy makers the opportunity to act before it is too late. The ten economic variables are commented on below:

1. Initial weekly claims for unemployment insurance – an increase in the claims for unemployment insurance suggests that firms are letting people go. An increase signals that there is diminishing demand for labor because production, as measured by GDP, is declining.
2. New orders for consumer goods – new orders with manufacturers usually result in increased production and an additional boost to an economy’s production (GDP). However, if there is a decrease in the number of new orders, it usually means the economy is slowing.
3. Average workweek – a lengthening workweek suggests more production and higher GDP. However, a shortening of the average workweek suggests production is slowing and that GDP is likely to decline.
4. New orders for capital goods – an increase in new orders for capital goods suggests firms are expanding, which could result in increased production. A decline in new orders for capital goods means that firms do not have a need to increase their production capacities by acquiring land, buildings, and equipment.
5. Vendor on-time delivery – Slower on-time deliveries suggest increased demand for good as a result of firms’ inability to keep up with the increased demand. On the other hand, more on-time deliveries suggest that there is not an increasing demand for goods or services because firms are able to keep up with orders.
6. Building permits for houses – An increase in permits means more production and greater output for the economy.
7. Stock prices – Increasing stock prices reflect expected increases in corporate profits based on higher production and thus greater productive output. A decrease in the stock prices means investors are skeptical about productive output and profits. Thus, the investors withhold their investments as production slows.
8. Money Supply – Increases in the money supply cause lower interest rates, higher aggregate demand, and higher GDP.
9. Long-term vs. short-term interest rate differential – A small difference between long-term and short-term interest rates suggests that the Fed is causing higher short-term rates (the rates that the Fed has the most control over) to slow the economy. Higher short-term interest rates are associated with lower GDP.
10. Consumer expectations – Such expectations measured by the index of consumer expectations are subtle reflections of future consumption by consumers. A decline in the index may predict a future decline in aggregate demand and lower GDP.

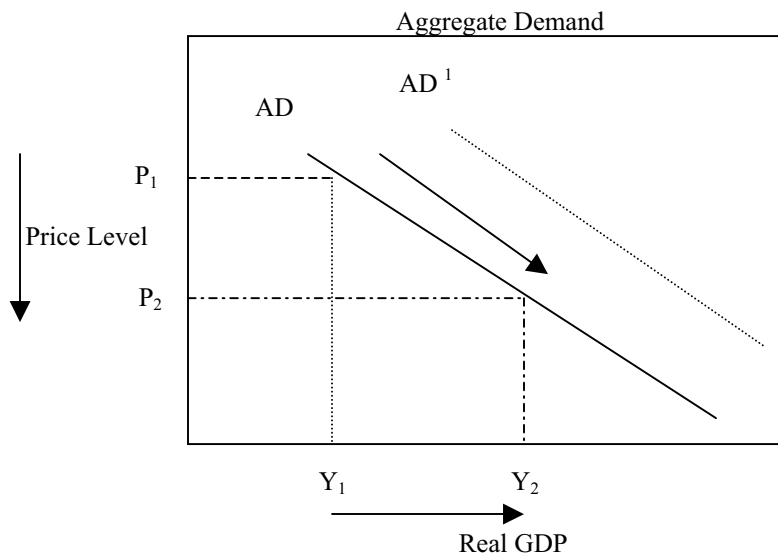
Now that we have examined the elements that are included in GDP and the items that are useful in predicting GDP, let's analyze GDP from an **aggregate supply** and **aggregate demand** perspective. Aggregate supply is a curve that represents the Real GDP that all firms will produce at each price level. The graph below depicts the shape of the aggregate supply curve.



The horizontal range of the aggregate supply curve represents the aggregate supply during the recession phase of the business cycle. In the horizontal range, firms can employ resources that have been idle without putting upward pressure on price levels. In the intermediate range of the aggregate supply curve, expansion of real output will be accompanied by an increasing price level. In the vertical range of the aggregate supply curve, the economy is operating at full capacity and increases in price level will not be accompanied by increases in production because of the lack of unused capacity. In the vertical range there is a strong tendency toward increases in the price level. The vertical range occurs during the latter stages of the expansion phase of the business cycle.

Aggregate demand (AD) is equal to the total (aggregate) real expenditures on final goods and services within an economy for a given time period. The aggregate demand curve is a curve that shows the demand relationship between Real GDP and the general price level. As the general price level decreases, Real GDP increases, and vice versa. The graph below illustrates the aggregate demand curve. Notice that it is downward sloping to the right. There are three reasons why the aggregate demand curve is downward sloping. Those reasons are as follows:

- a. A change in price level, or the wealth effect – a change in the price level changes the power of financial assets (money). So, if the price level falls, consumers can buy more goods with the same fixed quantity of money. Hence, real GDP increases.
- b. An interest rate effect – If the price level falls, the lower price level causes a reduction in the demand for money. That reduction in the demand for money lowers the real interest rate and spurs additional demand. That will cause GDP to increase.
- c. An international trade effect – With everything else remaining constant, a decrease in price level will make the goods that are produced domestically cheaper. When domestic goods are cheaper than foreign goods, net exports will increase, consumers will tend to buy more domestic goods and fewer foreign goods, and real GDP will increase.



A decline in the price level from P_1 to P_2 will result in the real GDP increasing from Y_1 to Y_2 given the aggregate demand curve AD.

Notice that the Aggregate Demand graph shows two parallel downward sloping aggregate demand curves. The one representing the current state of the aggregate demand curve is labeled AD and the aggregate demand curve representing the alternate state is labeled AD¹. The AD¹ curve has shifted outward and to the right indicating that at every price level GDP will be greater than with the original AD curve. The aggregate demand curve shifts from AD to AD¹ for various reasons.

The factors that cause a shift in the aggregate demand curve include the following:

1. Change in consumer spending
2. Change in investment spending
3. Change in government spending
4. Change in net export spending

The outward shift to the right of the AD¹ curve could have been caused by the following positive consumer spending factors:

1. Consumers having more wealth (e.g., increase in stock prices)
2. Consumers having higher expectations concerning the economy
3. Consumers having lower household debt. Thus, they have borrowing power.
4. Consumers having lower taxes

The outward shift to the right of the AD¹ curve could have been caused by the following positive investment spending factors:

1. Lower interest rates
2. Higher expected business profits
3. Lower business taxes

Fiscal policies are actions that are implemented by government through spending and taxation. The impact that these actions have on the aggregate demand are illustrated below:

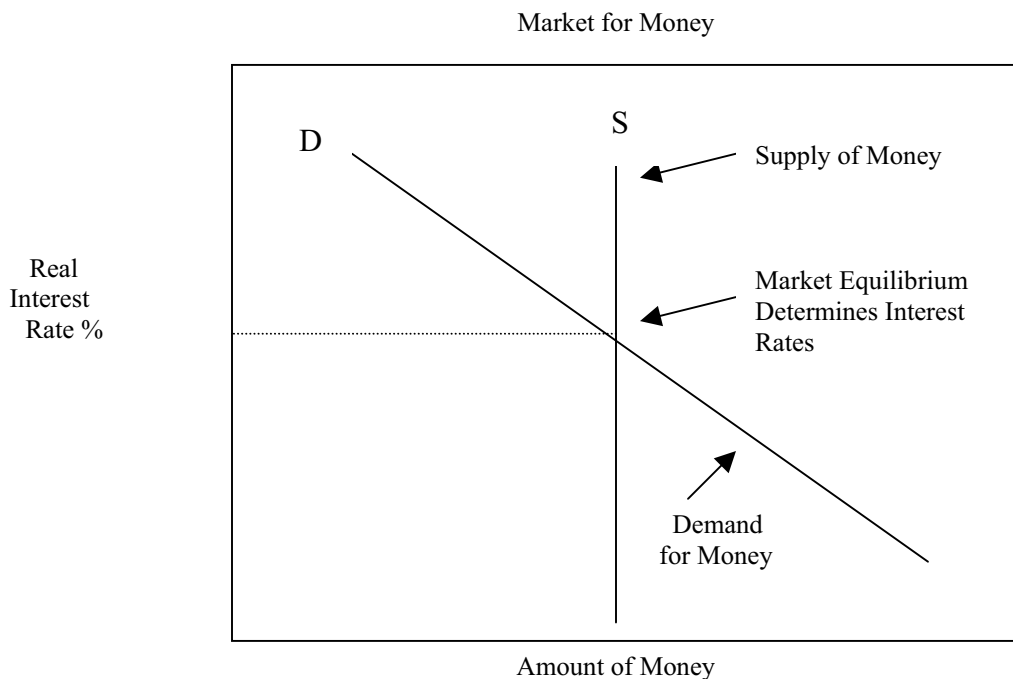
1. An increase in government spending will cause the aggregate demand curve to shift outward and to the right. The curve will shift out and to the right because the government will increase the consumption of goods and services, which stimulates aggregate demand and increases GDP. On the other hand, a decrease in government spending will have the opposite effect.
2. A change in taxation legislation will also impact the aggregate demand curve. As noted above, a decrease in personal taxes and business taxes will cause the aggregate demand curve to shift outward and to the right. This is so because consumers will now have more disposable income to spend in purchasing goods and services. With greater income comes greater demand causing the aggregate

demand curve to shift outward and to the right. On the contrary, an increase in taxes will have the opposite effect.

Another reason the aggregate demand curve would shift outward and to the right is because of the impact of net exports. The impact that net exports have on the aggregate demand curve is illustrated below:

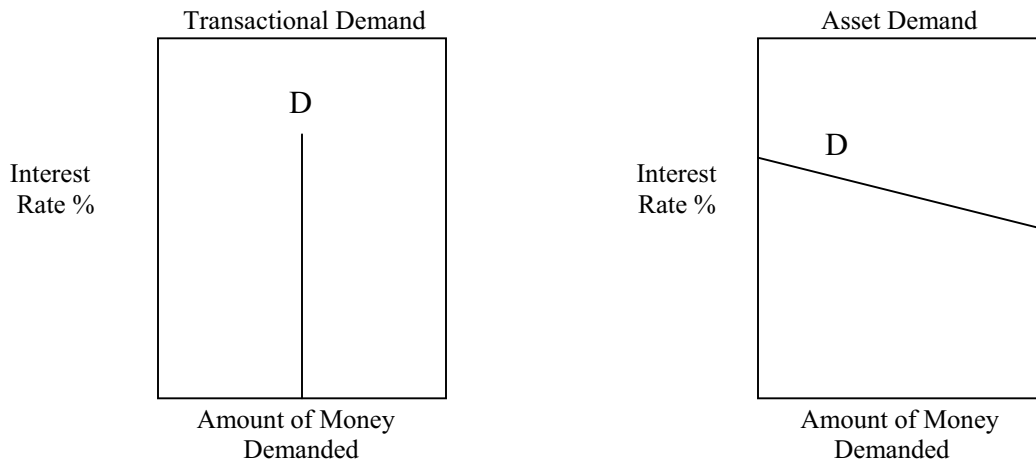
1. A higher level of exports causes an increase in production. Higher incomes abroad will cause increased exports.
2. Depreciation of the domestic currency in relation to other currencies causes domestic exports to be cheaper in the world market. The result is increased exports and higher aggregate demand.

Another economic measure is the size of the **money supply**. The money supply is best considered in the context of the **market for money (money market)** where both the demand for money and the money supply are considered in terms of their combined impact on interest rates.



The interest rate is the price paid for money and just like any market for commodities, the price of money (the interest rate) is determined by the forces of money supply and money demand. The graph shown above illustrates the intersection of the supply and demand curves for money and how that intersection (the market equilibrium of supply and demand) determines the real interest rate.

Money is needed (demanded) for two basic reasons – for transactions and for a store of value (an asset). Thus, the demand for money is the combination of these two sub-demands. The transactional demand for money varies directly with Nominal GDP. As Nominal GDP increases, the transactional demand for money increases because the higher level of economic activity increases the number of economic transactions and thus increases the need for money. The demand for money that originates from money as a store of value is a demand that is inversely related to the interest rate. When the interest rate is high, people are less likely to hold money as an asset because it is costly to hold money assets. When interest rates are low, the opportunity cost of holding money assets is low and thus people are more likely to want the security of liquid money assets.



The demand curve in the “Market for Money” graph is the combination of the two demand curves shown immediately above. Thus, the demand curve in the “Market for Money” graph is steeper than the demand curve for “Asset Demand” but not as steep as the demand curve for “Transactional Demand.”

Notice that the demand curve for Transactional Demand is inelastic (a straight vertical line) in relation to interest rates. That means the transactional demand is not influenced by interest rates. As stated earlier, transactional demand is influenced by Nominal GDP. On the other hand, the asset demand is influenced by the interest rate and thus it is shown with a gently slanting line indicating that it tends to be elastic demand. Elastic demand means that a small percentage change in the interest rate percentage will result in a greater percentage change in the amount of money demanded.

Referring to the “Market for Money” graph, it should be clear that an increase in the Nominal GDP will shift the demand curve up and to the right. With no change in money supply, such a shift would cause interest rates to increase because the market equilibrium point will shift upwards. On the other hand, a decline in Nominal GDP will cause the demand curve to shift down and to the left. Such a shift, with no change in money supply, would cause the market equilibrium to shift downwards and interest rates will decline.

Now that we have examined the sources of change in the demand for money, let’s discuss the measures of money supply. There are three components of the money supply, M1, M2, and M3. In general the M1 money supply contains the most liquid of the financial assets, then M2, and finally M3. The various components (**M1**, **M2**, and **M3**) of the money supply are described and related to each other below:

M1 includes the following:

- Currency (counts and paper money)
- Travelers checks
- Demand deposits and other checkable deposits

M2 includes all that is included in M1 plus the following:

- Savings deposits and money market deposits
- Certificates of deposit of less than \$100,000
- Money Market mutual funds
- Small denomination time deposits

M3 includes all that is included in M2 plus the following:

- Certificates of deposit and time deposits of \$100,000 or more

With regard to the money supply, economists typically focus on the M1 level. The other levels of money supply (**M2** and **M3**) are measures used for other more specialized purposes. For example, M3 is used as a trend variable in the index of leading economic indicators.

In the United States of America, the **Federal Reserve System (the Fed)** and its member banks are the means by which the money supply is changed. In addition to being the central bank of the United States, the Fed issues currency, clears checks, supervises the banking system, and implements **monetary policy**. Monetary policy involves the use of **Open Market Operations**, the **reserve ratio**, and the **discount rate** as a means of changing the reserves of the member banks. By changing the reserves of member banks, the member banks will have more or less money to lend to consumers and businesses.

Open market operations alter the reserves of member banks as a result of the Fed's net purchase or sale of government securities. If the Fed wants to expand the money supply, it merely seeks to become a net buyer of government securities from commercial banks or from the public. The buying of government securities puts money in the hands of the sellers, and that money moves to the commercial banks thus increasing the reserves of the commercial banks. The increase in reserves permits the banks to make more loans, thus increasing the money supply even more. The opposite is true when the Fed is a net seller of government securities in an attempt to reduce the money supply. The selling of securities takes money out of the hands of the buyers and thus, out of the commercial banks. The removal of the money from the commercial banks decreases the reserve. The reduced reserve will decrease the amount that the bank may loan.

The Fed may also use the **reserve ratio** to influence the money supply. If the Fed decreases the reserve ratio, it means that the member banks must keep less of their deposits in the form of reserves. Reserve funds can then be loaned to consumers or businesses, expanding the money supply. However, if the reserve ratio is increased, member banks are required to keep more money in their reserves and are not going to have as much money to loan out. A reduction in loans will reduce the money supply.

Lastly, the member banks borrow from the Fed and the interest rate that the Fed charges the member banks is called the **discount rate**. By borrowing from the Fed, member banks can increase their reserves and thus increase their lending to consumers and to businesses. Thus, an increase in the discount rate will cause banks to cut back on their borrowing from the Fed, and a decrease in the discount rate will cause banks to increase their borrowing from the Fed. A lower discount rate will cause the money supply to increase and a higher discount rate will cause the money supply to decline.

Of the three tools the Fed uses to influence the money supply, by far the most important is the open market operations tool (buying and selling of government securities). The Fed uses the reserve ratio tool only occasionally and it uses the discount rate tool only as an afterthought to announce to the public that it is seeking to increase the money supply or decrease the money supply.

Now that we have examined the supply of and the demand for money, as well as their impact on interest rates, let's examine the implications of changes in the elements that make up the market for money. If the problem with the national economy is that there is high unemployment and the tendency is toward a recession, the chain of events might be as follows:

The Fed Buys Government Securities → Money Supply Increases → Interest Rate Declines
→ Spending Increases → Aggregate Demand Increases → Real GDP Increases
→ Employment Increases → Recession Averted

On the other hand, if the concern is that the national economy is experiencing inflationary pressures, the chain of events might be as follows;

The Fed Sells Government Securities → Money Supply Declines → Interest Rate Increases
→ Spending Declines → Aggregate Demand Declines → Inflation Pressures Diminish

Chapter Five

Multiple Choice Questions

- Fiscal policy refers to the:
 - manipulation of government spending and taxes to stabilize domestic output, employment, and the price level.
 - manipulation of government spending and taxes to achieve greater equality in the distribution of income.
 - altering of the interest rate to change aggregate demand.
 - fact that equal increases in government spending and taxation will be contractionary.
- Expansionary fiscal policy is so named because it:
 - involves an expansion of the nation's money supply.
 - necessarily expands the size of government.
 - is aimed at achieving greater price stability.
 - is designed to expand real GDP.
- Suppose that the economy is in the midst of a recession. Which of the following policies would be consistent with active fiscal policy?
 - a Congressional proposal to incur a Federal surplus to be used for the retirement of public debt
 - a reduction in agricultural subsidies and veterans' benefits
 - a postponement of a highway construction program
 - a reduction in Federal tax rates on personal and corporate income
- An appropriate fiscal policy for a severe recession is:
 - a decrease in government spending.
 - a decrease in tax rates.
 - appreciation of the dollar.
 - an increase in interest rates.
- An appropriate fiscal policy for severe demand-pull inflation is:
 - an increase in government spending.
 - depreciation of the dollar.
 - a reduction in interest rates.
 - a tax rate increase.
- In an aggregate demand-aggregate supply diagram, equal decreases in government spending and taxes will:
 - shift the AD curve to the right.
 - increase the equilibrium GDP.
 - not affect the AD curve.
 - shift the AD curve to the left.
- An expansionary fiscal policy is shown as a:
 - rightward shift in the economy's aggregate demand curve.
 - movement along an existing aggregate demand curve.
 - leftward shift in the economy's aggregate supply curve.
 - leftward shift in the economy's aggregate demand curve.
- Which of the following is not an item in the list of leading economic indicators?
 - changes in mutual fund balances
 - the length of the average work week
 - the money supply
 - the value of the index of consumer expectations
- In the United States, the money supply (M1) is comprised of:
 - coins, paper currency, and checkable deposits.
 - currency, checkable deposits, and Series E bonds.
 - coins, paper currency, checkable deposits, and credit balances with brokers.
 - paper currency, coins, gold certificates, and time deposits.
- The value of money varies:
 - inversely with the price level.
 - directly with the volume of employment.
 - directly with the price level.
 - directly with the interest rate.
- The difference between M1 and M2 is that:
 - the former includes time deposits.
 - the latter includes small time deposits, non-checkable savings accounts, money market deposit accounts, and money market mutual fund balances.
 - the latter includes negotiable government bonds.
 - the latter includes cash held by commercial banks and the U. S. Treasury.

12. The purchase of government securities from the public by the Fed will cause:
- commercial bank reserves to decrease.
 - the money supply to increase.
 - demand deposits to decrease
 - the interest rate to increase.
13. Which of the following will increase commercial bank reserves?
- the purchase of government bonds in the open market by the Federal Reserve Banks
 - a decrease in the reserve ratio
 - an increase in the discount rate
 - the sale of government bonds in the open market by the Federal Reserve Banks
14. If the Federal Reserve System buys government securities from commercial banks and the public:
- commercial bank reserves will decline.
 - commercial bank reserves will be unaffected.
 - it will be easier to obtain loans at commercial banks.
 - the money supply will contract.
15. Which of the following best describes the cause-effect chain of an easy money policy?
- A decrease in the money supply will lower the interest rate, increase investment spending, and increase aggregate demand and GDP.
 - A decrease in the money supply will raise the interest rate, decrease investment spending, and decrease aggregate demand and GDP.
 - An increase in the money supply will raise the interest rate, decrease investment spending, and decrease aggregate demand and GDP.
 - An increase in the money supply will lower the interest rate, increase investment spending, and increase aggregate demand.
16. If the economy were encountering a severe recession, proper monetary and fiscal policies would call for:
- selling government securities, raising the reserve ratio, lowering the discount rate, and a budgetary surplus.
 - buying government securities, reducing the reserve ratio, reducing the discount rate, and a budgetary deficit.
 - buying government securities, raising the reserve ratio, raising the discount rate, and a budgetary surplus.
 - buying government securities, reducing the reserve ratio, raising the discount rate, and a budgetary deficit.
17. Suppose the total market value of all final goods and services produced in a particular country in 2001 is \$500 billion and the total market value of final goods and services sold is \$450 billion. We can conclude that:
- GDP in 2001 is \$450 billion.
 - NDP in 2001 is \$450 billion.
 - GDP in 2001 is \$500 billion.
 - inventories in 2001 fell by \$50 billion.
18. In national income accounting, consumption expenditures include:
- purchases of both new and used consumer goods.
 - consumer durable goods and consumer nondurable goods, but not services.
 - consumer durable goods, consumer nondurable goods, and services.
 - changes in business inventories.
19. Suppose that GDP was \$200 billion in year 1 and that all other components of expenditures remained the same in year 2 except that business inventories increased by \$10 billion. GDP in year 2 is:
- \$180 billion.
 - \$190 billion.
 - \$200 billion.
 - \$210 billion.
20. GDP differs from NDP in that:
- GDP is based on gross exports, while NDP is based on net exports.
 - GDP includes, but NDP excludes, indirect business taxes.
 - net investment is used in calculating GDP and gross investment is used in calculating NDP.
 - gross investment is used in calculating GDP and net investment is used in calculating NDP.
21. NDP is:
- NI plus net foreign factor income earned in the U.S. plus indirect business taxes.
 - NI plus corporate income taxes.
 - GDP deflated for increases in the price level.
 - GDP minus indirect business taxes.

22. If personal income exceeds national income in a particular year, we can conclude that:
- transfer payments exceeded the sum of social security contributions, corporate income taxes, and indirect business taxes.
 - the sum of social security contributions, corporate income taxes, and undistributed corporate profits exceeded transfer payments.
 - consumption of fixed capital and indirect business taxes exceeded personal taxes.
 - transfer payments exceeded the sum of social security contributions, corporate income taxes, and undistributed corporate profits.
23. The amount of after-tax income received by households is measured by:
- discretionary income.
 - national income.
 - disposable income.
 - personal income.
24. Real GDP measures:
- current output at current prices.
 - current output at base year prices.
 - base year output at current prices.
 - base year output at current exchange rates.
25. The fact that nominal GDP has risen faster than real GDP:
- suggests that the base year of the GDP price index has been shifted.
 - tells us nothing about what has happened to the price level.
 - suggests that the general price level has fallen.
 - suggests that the general price level has risen.
26. The aggregate demand curve:
- is up-sloping because a higher price level is necessary to make production profitable as production costs rise.
 - is down-sloping because production costs decline as real output increases.
 - shows the amount of expenditures required to induce the production of each possible level of real output.
 - shows the amount of real output that will be purchased at each possible price level.
27. Which one of the following would not shift the aggregate demand curve?
- a change in the price level
 - depreciation of the international value of the dollar
 - a decline in the interest rate at each possible price level
 - an increase in personal income tax rates

28. An increase in investment spending caused by higher expected rates of return will:
- shift the aggregate supply curve to the left.
 - move the economy up along an existing aggregate demand curve.
 - shift the aggregate demand curve to the left.
 - shift the aggregate demand curve to the right.

29. The U.S. Gross Domestic Product (GDP) is defined as which of the following?
- The value of all goods and services produced.
 - The value of all goods and services produced by Americans.
 - The value of all goods and services produced in America.
 - The value of all final goods and services produced in America.

30. All the following are “leading” indicators of the level of economic activity in the U.S. EXCEPT:
- New private housing construction starts
 - Common stock prices
 - Average weekly new claims for unemployment compensation
 - Size of the money supply

31. Assume the following data for the U.S. economy in a recent year:

Personal consumption expenditures	\$5,015 billion
Exports	\$106 billion
Government purchases of goods/services	\$1,040 billion
M1	\$247 billion
Imports	\$183 billion
Gross private domestic investment	\$975 billion
Open market purchases by Federal Reserve	\$4 billion

Which of the following is the U.S. GDP based on the above information?

- \$4,087 billion
- \$5,123 billion
- \$6,953 billion
- \$7,208 billion

32. A tightening of monetary policy would normally be expected to result in:
- Higher bond and common stock prices.
 - Lower interest rates and stock prices.
 - Higher interest rates and lower stock prices.
 - Higher interest rates and higher stock prices.

33. If the Consumer Price Index rises during the year from 176.0 to 179.5, the rate of inflation during the year is:

- a. 1.1%
- b. 1.9%
- c. 2.0%
- d. Answer cannot be determined from the information provided.

34. Which of the following is (are) among the elements of fiscal policy?

- (1) Government actions to raise or lower taxes
 - (2) Government actions to raise or lower the size of the money supply
 - (3) Government actions to raise or lower the amount it spends
- a. (1) only
 - b. (1) and (3) only
 - c. (2) and (3) only
 - d. (1), (2), and (3)

35. When the Federal Reserve engages in open market operations by buying government securities, which of the following is (are) likely to result?

- (1) Lower interest rates
 - (2) Lower size of the money supply
- a. (1) only
 - b. (2) only
 - c. Both (1) and (2)
 - d. Neither (1) nor (2)

36. When the Federal Reserve wants to tighten the availability of credit, it should so which of the following?

- (1) Sell government securities
 - (2) Raise the discount rate
- a. (1) only
 - b. (2) only
 - c. Both (1) and (2)
 - d. Neither (1) nor (2)

37. The discount rate is the rate at which:

- a. The Federal Reserve will sell government securities.
- b. Banks will lend to their best customers.
- c. The Treasury auctions off Treasury bills.
- d. The Federal Reserve will lend to member banks.

38. A raising of the reserve requirement by the Federal Reserve is likely to have all the following effects EXCEPT:

- a. Tighten the money supply
- b. Lead to higher stock prices
- c. Raise interest rates
- d. Slow down the growth of GDP

39. The federal government measures inflation with which of the following indicators?

- a. Dow Jones Index.
- b. Consumer Price Index.
- c. Consumer Confidence Index.
- d. Corporate profits.

40. Which of the following concepts compares the price of goods in a given year to a base year?

- a. Consumer Price Index.
- b. Consumer Confidence Index.
- c. Gross National Product.
- d. Net National Product.

Chapter Five

Answers to Multiple Choice Questions

1. Answer (a) is the correct answer. Fiscal policy makes use of government spending and taxation to regulate the economy for stability. Answer (b) is not correct because government spending and taxation do not have the purpose of achieving greater equality in the distribution of income. Answer (c) is not correct because it is monetary policy, not fiscal policy, that is used to alter the interest rate to change aggregate demand. Answer (d) is not correct because fiscal policy deals with government spending and taxation; but not with the fact that government spending and taxation will be contradictory. In fact the increase in government spending along with a reduction in taxation would be expansionary.
2. Answer (d) is the correct answer. The word expansionary explains it all. Answer (a) is not correct because fiscal supply is not designed to change the money supply. Answer (b) is not the correct answer because fiscal policy may or may not expand the size of government. Answer (c) is not the correct answer because monetary policy, not fiscal policy, is focused on price stability.
3. Answer (d) is the correct answer. A reduction in federal tax rates is an appropriate fiscal policy to bring the economy out of a recession. Answer (a) is not correct because such an action would use higher taxes to buy back federal debt instruments. Answer (b) is not correct because such actions would negatively impact aggregate demand. Answer (c) is not correct because such an action would involve a reduction in government spending.
4. Answer (b) is the correct answer. A decrease in taxes will increase aggregate demand. Answer (a) is not correct because a decrease in government spending will tend to decrease aggregate demand. Answer (c) is not correct because an appreciation of the dollar will tend to make exports more expensive in the world market, thus negatively impacting aggregate demand. Answer (d) is not correct because an increase in interest rates will tend to shift the aggregate demand curve to the left.
5. Answer (d) is the correct answer. A tax rate increase is a fiscal policy and it is appropriate in that it will reduce customer spending and shift the aggregate demand curve inward. Answer (a) is not correct because an increase in government spending will move the aggregate demand curve outward. Answer (b) is not correct because depreciation of the dollar will cause exports to increase. Answer (c) is not correct because a reduction in interest rates will cause an outward shift in the aggregate demand curve and that will tend to increase the price level even more.
6. Answer (d) is the correct answer. Each of those two actions will tend to shift the aggregate demand curve inward and to the left because the decrease in government spending will have a greater impact than the impact of lower taxes. This is true because some of the lower taxes will be saved by consumers. Answer (a) is not correct because the government spending impact will be greater than the tax impact. Answer (b) is not correct because the aggregate supply will not change and the aggregate demand will shift to cause a lower price level. Answer (c) is not correct because the government spending impact on aggregate demand will be greater than the tax impact on aggregate demand.
7. Answer (a) is the correct answer. An expansionary fiscal policy will result in a rightward, or outward shift in the aggregate demand curve. Answer (b) is not correct because fiscal policy involves government spending and taxation and both are intended to shift the aggregate demand curve. Answer (c) is not correct because fiscal policy does not impact the aggregate supply curve. Answer (d) is not correct because the impact on the aggregate demand curve will be just the opposite.
8. Answer (a) is the correct answer. Changes in mutual fund balances are not part of the list of leading economic indicators. Answer (b) is not correct because the length of the average work week is in the list of leading economic indicators. Answer (c) is not correct because the money supply is in the list of leading economic indicators. Answer (d) is not correct because the value of the index of consumer expectations is in the list of leading economic indicators.
9. Answer (a) is the correct answer. M1 is the most liquid of the money supply classifications. Answer (b) is not correct because Series E bonds are not a part of the money supply. Answer (c) is not correct because credit balances with brokers is not a part of the money supply. Answer (d) is not correct because gold certificates are not a part of the money supply.

10. Answer (a) is the correct answer. As the price level increases, the value of money declines. Answer (b) is not correct because as the volume of employment increases, the price level is likely to increase and a price level increase will cause a decrease in the value of money. Answer (c) is not correct because the value of money declines as the price level increases. Answer (d) is not correct because inflation will tend to cause interest rates to increase and inflation causes the value of money to decline.

11. Answer (b) is the correct answer. The list provided in the question includes items that are included in M2, but not in M1. Answer (a) is not correct because M1 does not include time deposits. Answer (c) is not correct because the money supply does not include negotiable government bonds. Answer (d) is not correct because cash held in the U. S. Treasury is not included in the money supply.

12. Answer (b) is the correct answer. The purchase of government securities by the government puts money in the hands of consumers. Answer (a) is not correct because the purchase of government securities by the government will tend to cause commercial bank reserves to increase because it will put money in the hands of the people. Answer (c) is not correct because the purchase of government securities by the government will cause demand deposits to increase as people put the money in their bank accounts. Answer (d) is not correct because such an action will increase the money supply and the increase in the money supply will tend to cause interest rates to decrease.

13. Answer (a) is the correct answer. The purchase of government bonds by the Fed will put money in the hands of people and those people will put the money in commercial banks. Answer (b) is not correct because only a specific policy decision by the Fed can change the reserve ratio. Answer (c) is not correct because only a specific policy decision by the Fed can change the discount rate. Answer (d) is not correct because the sale of government bonds will take money out of the hands of the people and the people will pay for the bonds by withdrawing money from the commercial banks.

14. Answer (c) is the correct answer. The Fed's buying of government securities puts money in the hands of people and the people will deposit the money in commercial banks causing the bank to have more loanable reserves. Answer (a) is not correct because money will flow into the banks, not out of the banks. Answer (b) is not correct because money will flow into the banks and cause reserves to increase. Answer (d) is not correct because money will flow into the hand of the people.

15. Answer (d) is the correct answer. An increase in the money supply will lower the interest rate, increase investment spending, and increase aggregate demand. Answer (a) is not correct because a decrease in the money supply will not cause a lower interest rate. Answer (b) is not correct because a decrease in the money supply may not result in a decline in GDP if the aggregate demand curve crosses the aggregate supply curve in the vertical range of the aggregate supply curve. Answer (c) is not correct because an increase in the money supply will reduce the interest rate.

16. Answer (b) is the correct answer. The specified combination of Fed monetary policies and Federal Fiscal policies would be appropriate for a severe recession. Answer (a) is not correct because raising the reserve ratio and a budgetary surplus would be contrary actions in the face of a severe recession. Answer (c) is not correct because raising the reserve ratio, raising the discount rate, and a budgetary surplus are inconsistent with an attempt to overcome a severe recession. Answer (d) is not correct because raising the discount rate has the effect of reducing the money supply at a time when the money supply needs to increase to address the severe recession.

17. Answer (c) is the correct answer. GDP measures the value of all final goods and services produced, not sold. Answer (a) is not correct because GDP measures the value of all final goods and services produced, not sold. Answer (b) is not correct because NDP is the value of all final goods and services produced within a nation's borders less depreciation. Answer (d) is not correct because the logic of changes in inventory would suggest that inventories increased rather than decreased.

18. Answer (c) is the correct answer. Consumption expenditures include consumer durable goods, non-durable goods, and services. Answer (a) is not correct because consumption expenditures do not include second-hand goods because there is no production of those goods in the current year. Answer (b) is not correct because consumption expenditures do include the expenditures for services. Answer (d) is not correct because business inventories represent goods that have been produced but not yet purchased.

19. Answer (d) is the correct answer. GDP measures the value of all final goods and services produced and the \$10 billion increase in business inventories represents the only change from the prior year. Answer (a) is not correct because there is not information that would lead to that answer. Answer (b) is not correct because the change in business inventories was an increase, not a decrease. Answer (c) is not the correct answer because the change in business inventories suggests that more goods were produced in year 2 than in year 1.
20. Answer (d) is the correct answer. NDP is GDP less depreciation. Answer (a) is not correct because exports do not explain the difference between NDP and GDP. Answer (b) is not correct because indirect business taxes do not explain the difference between NDP and GDP. Answer (c) is not correct because gross investment is used in calculating GDP.
21. Answer (a) is the correct answer. Net foreign factor income and indirect business taxes explain the difference between NI and NDP. Answer (b) is not correct because corporate taxes are part of the difference between national income (NI) and personal income (PI). Answer (c) is not correct because GDP deflated for price level changes is called "Real GDP." Answer (d) is not correct because indirect business taxes is only one of the elements that explains the difference between NDP and NI.
22. Answer (d) is the correct answer. Personal income is equal to national income less social security contributions, less undistributed corporate profits, less corporate income taxes, plus transfer payments. Answer (a) is not correct because indirect business taxes are not an element in the difference between personal income and national income. Answer (b) is not correct because in such a situation, personal income would be less than national income. Answer (c) is not correct because indirect business taxes, consumption of fixed capital (depreciation), and personal taxes are not elements that explain the difference between national income and personal income.
23. Answer (c) is the correct answer. Disposable income is personal income less personal taxes. Answer (a) is not correct because discretionary income is the income available after making all payments on contractual obligations. Answer (b) is not correct because national income has not yet had taxes deducted. Answer (d) is not correct because personal income has not yet had personal taxes deducted.
24. Answer (b) is the correct answer. Real GDP measures current output at base year prices. Answer (a) is not correct because the word "Real" suggests that the measure is based on other than current prices. Answer (c) is not correct because Real GDP refers to the current year production. Answer (d) is not correct because exchange rates are not used to convert nominal GDP to real GDP.
25. Answer (d) is the correct answer. If nominal GDP rises faster than real GDP, it means that the general price level has risen. Answer (a) is not correct because the shifting of the base year is never done. Answer (b) is not correct because the relationship between nominal GDP and real GDP does reveal meaningful information about the price level. Answer (c) is not correct because if the price level had fallen, the real GDP would be lower than the previous year.
26. Answer (d) is the correct answer. The aggregate demand curve shows the relationship between the price level and real GDP. Answer (a) is not correct because the answer better describes the aggregate supply curve. Answer (b) is not correct because production costs are used to describe the slopes of the aggregate supply curve. Answer (c) is not correct because the aggregate demand curve shows the relationship between real GDP and some other variable other than "expenditures required."
27. Answer (a) is the correct answer. A change in the price level would result in an increase in real GDP without shifting the aggregate demand curve. Answer (b) is not correct because depreciation of the international value of the dollar will impact demand for exports and that will cause a shift in the aggregate demand curve. Answer (c) is not correct because the aggregate demand curve shows the relationship between the price level and real GDP. Answer (d) is not correct because an increase in personal income tax rates will cause a shift in the aggregate demand curve.
28. Answer (d) is the correct answer. An increase in investment spending will cause the aggregate demand curve to shift to the right. Answer (a) is not correct because an increase in investment impacts the aggregate supply curve. Answer (b) is not correct because an increase in investment spending will not have an impact on the price level, one of the axis of the aggregate demand curve. Answer (c) is not correct because an increase in investment spending will have a positive impact on real GDP.

29. Answer (d) is the correct answer. Answer (a) is incorrect because it includes all intermediate goods, such as automobile transmissions along with the auto itself. Answer (b) is not correct because it includes intermediate goods and also because production in America by non-Americans is also included in GDP. Answer (c) is not correct because it includes all intermediate goods, such as automobile transmissions along with the auto itself.
30. Answer (a) is the correct answer. Building permits, not construction starts, is an item among the leading indicators of economic activity. Answer (b) is not correct because common stock prices is an item among the leading economic indicators. Answer (c) is not correct because average weekly new claims for unemployment compensation is an item among the leading economic indicators. Answer (d) is not correct because the size of the money supply is an item among the leading economic indicators.
31. Answer (c) is correct. Consumption (\$5,015) + Investment (\$975) + Government (\$1,040) – Net Imports (\$183 - \$106) = \$6,953. Answer (a) is not correct because Consumption + Investment + Government – Net Imports = GDP. Answer (b) is not correct because Consumption + Investment + Government – Net Imports = GDP. Answer (d) is not correct because Consumption + Investment + Government – Net Imports = GDP.
32. Answer (c) is the correct answer. Tighter monetary policy means that actions are being taken by the Federal Reserve that will cause interest rates to rise, and rising interest rates will cause stock prices to be lower. Answer (a) is incorrect because tighter monetary policy suggests higher interest rates and higher interest rates will result in lower bond values and likely lower common stock prices. Answer (b) is incorrect because a tighter monetary policy will likely result in higher interest rates. Answer (d) is incorrect because a tighter monetary policy will likely result in higher interest rates which will cause lower stock prices.
33. Answer (c) is the correct answer because $(179.5 - 176.0) / 176.0 = 2.0\%$. Answer (a) is not correct because $(X - Y) / Y$ is the formula. Answer (b) is not correct because $(X - Y) / Y$ is the formula. Answer (d) is not correct because $(X - Y) / Y$ is the formula.
34. Answer (b) is the correct answer. Fiscal policy is implemented through the raising and lowering of taxes and through the raising and lowering of government spending. Answer (a) is not correct because there is another aspect to fiscal policy other than just taxation. Answer (c) is not correct because government actions to raise or lower the size of the money supply is an aspect of monetary policy, not fiscal policy. Answer (d) is not correct because government actions to raise or lower the size of the money supply is an aspect of monetary policy, not fiscal policy.
35. Answer (a) is the correct answer. The Fed's buying of government securities will increase the money supply and lower interest rates. Answer (b) is not correct because the Fed's buying of government securities will increase the money supply. Answer (c) is not correct because the Fed's buying of government securities will increase the money supply. Answer (d) is not correct because the Fed's buying of government securities will lower interest rates.
36. Answer (c) is the correct answer. Both the selling of government securities and the raising of the discount rate will tend to tighten the availability of credit. Answer (a) is not correct because raising the discount rate will also tighten the availability of credit. Answer (b) is not correct because selling government securities will also tighten the availability of credit. Answer (d) is not correct because both the selling of government securities and the raising of the discount rate will tend to tighten the availability of credit.
37. Answer (d) is the correct answer. The discount rate is the rate at which the Fed will lend to member banks. Answer (a) is not correct because the rate at which the Fed will sell government securities is determined by the market. Answer (b) is not correct because the rate at which the banks will lend to their customers is determined by competition among banks. Answer (c) is not correct because the rate at which the Treasury auctions off Treasury bills is determined by the market.
38. Answer (b) is the correct answer. The raising of the reserve requirements will tend to raise interest rates and that will tend to cause lower stock prices. Answer (a) is not correct because a raising of the reserve requirements will tend to tighten the money supply. Answer (c) is not correct because the raising of the reserve requirement will tend to raise interest rates. Answer (d) is not correct because the raising of the reserve requirement will tend to raise interest rates and that will tend to slow down the growth of GDP.

39. Answer (b) is the correct answer. The Consumer Price Index measures inflation in the U.S. by comparing the price of a market basket in the current year to the price of the same market basket in the base year. Answer (a) is wrong because the Dow Jones Index is an average of a basket of blue-chip stocks. Answer (b) is incorrect because the Consumer Confidence Index is considered a variable in causing changes in business cycles.

40. Answer (a) is the correct answer. The Consumer Price Index measures inflation in the U.S. by comparing the price of a market basket in the current year to the price of the same market basket in the base year.

Chapter Nine
Financial Statement Implications of
Liquid Asset Management

CASH MANAGEMENT 9-1

LOCKBOX ACCOUNTS..... 9-2

INVENTORY MANAGEMENT 9-2
 Economic Order Quantity (EOQ)

RATIO ANALYSIS..... 9-4

Chapter Nine

Financial Statement Implications of Liquid Asset Management

Cash Management:

- Cash is held for three reasons
 - Medium of exchange to conduct business
 - For emergencies.
 - In deflationary periods, cash goes up in value.
- Recognize the importance of synchronizing cash inflows and outflows.

Greater synchronizing means less idle cash. Growing business is good but puts strain on cash due to need to spend more before cash comes in from revenues.

Long-term assets generate greater return so the less a company has tied up in working capital, the better.
- Use zero balance account—checking account where bank will automatically transfer into the account the amount of charges for each day on the same day.
- Discounts for receivables and payables--Always pay within discount period and seek favorable credit terms for purchases.
- Payments should be made at the end of the discount periods if the return is more than the firm's cost of capital. The return on taking the discount is calculated using the following formula: (MEMORIZE)

$$\frac{360}{\text{total pay period} - \text{discount period}} \times \frac{\text{discount}}{(100 - \text{discount})}$$

The return on taking the discount is also the cost of not taking the discount. Credit terms of 2/10 n/30 means the purchaser gets a 2% discount if paid within 10 days. If not paid by the 10th day, the full amount must be paid on or before the 30th day. Therefore, it costs 2% to use the seller's money for 20 days. (30-10)

Example:

The high cost of short term financing has recently caused Loy Ltd. to re-evaluate the terms of credit it extends to its customers. The current policy is 1/10, net 30. If Loy's customers can borrow at the prime rate, at what prime rate must Loy change its terms of credit to avoid an undesirable extension in its collection of receivables?

- a. 12.5%
- b. 16.0%
- c. 14.5%
- d. 10.0%
- e. 19.0%

*** Answer is on next page. ***

Answer: (e) is correct.

First, we must calculate the cost of not taking the discount.

Using the formula to calculate the cost of not taking a discount, we have the following:

$$\frac{360}{(30-10)} \times \frac{1}{100-1}$$

$$18 \times .010101 = .1818 = 18.18\%$$

Thus, the prime rate where Loy must change its terms to avoid having customers not pay within the discount period would have to be greater than 18.18%. Thus, 19% is the only correct answer.

In other words, what interest rate must Loy's customers be charged by banks to borrow money? Would Loy's customers prefer to just borrow from Loy by not paying within the discount period. If Loy charges less than banks, then Loy's customers will not pay within the discount period.

Lockbox accounts are frequently used by large, multilocation companies to make collections in cities within areas of heaviest customer billing. The company rents a local post office box and authorizes a local bank to pick up the remittances mailed to that box number. The bank empties the box at least once a day and immediately credits the company's account for collections. The greatest advantage of a lockbox is that it accelerates the availability of collected cash. Generally, in a lockbox arrangement the bank microfilms the checks for record purposes and provides the company with a deposit slip, a list of collections, and any customer correspondence. If the control over cash is improved and if the income generated from accelerating the receipt of funds exceeds the cost of the lockbox system, then it is considered a worthwhile undertaking.

Intermediate Accounting, Keiso & Weygandt, Ninth Edition, Wiley.

Wire transfers are the fastest and most expensive way to transfer funds from lockboxes to a firm's main bank. A slower, but less expensive way, is to use a depository transfer check (official bank check). This is a bank check drawn on the local bank and payable to the concentration bank.

Inventory Management

How much to order, and when

The objective is to minimize three costs:

- Ordering costs
Varies with number of purchases
Includes receiving costs
- Carrying (holding) costs
Storage (opportunity cost – lost space rental)
Interest on money tied up (opportunity cost – of capital)
Spoilage, damage
Obsolescence
Property taxes
Insurance

- Stockout costs

Lost contribution margins
Customer bad will
Factory shutdowns

Economic Order Quantity (EOQ)

EOQ Model Assumptions

- Constant, known demand
- No quantity discounts
- No limit on order size
- Same order size each time
- Entire order received at one time

EOQ Computations (how much to order):

$$EOQ = \sqrt{\frac{2aD}{K}}$$

Where a = cost per purchase
D = Annual demand
K = Fixed cost of purchasing

Example: Moss Converters Inc. uses 100,000 pounds of raw material annually in its production process. Material cost is \$12 per pound. The cost to process a purchase order is \$45, which includes variable costs of \$35 and allocated fixed costs of \$10. Out-of-pocket handling and storage costs amount to 20 percent of the per pound cost. The company's cost of capital is 15 percent. The formula to determine the economic order quantity is

EOQ = SQRT (2 AD/K)
A = the annual unit demand.
D = the cost per order.
K = the cost of carrying one unit per year.

Moss' economic order quantity is

- 1,291 units.
- 1,464 units.
- 1,708 units.
- 1,936 units.
- 1,972 units.

Answer: (a) is correct.

The annual demand is given as 100,000 pounds. The cost per order is given as \$35. (Only the variable cost should be considered for this, not any allocated fixed cost which will not change in total if we process more or fewer purchase orders.) Carrying costs must be computed as the handling and storage costs plus the cost of capital, or 20% + 15%, multiplied by \$12 (the cost per pound). Thus K= 35% times \$12, or \$4.20. Consequently, EOQ equals the square root of 2 * 100,000 * \$35 / \$4.20, or the square root of 1,666,667, or 1,291.

Example: Companies that adopt just-in-time purchasing systems often experience

- a. an increase in carrying costs.
- b. a reduction in the number of suppliers.
- c. fewer deliveries from suppliers.
- d. a greater need for inspection of goods as the goods arrive.
- e. less need for linkage with a vendor's computerized order entry system.

ANSWER: (b) is correct.

JIT purchasing often involves a reduction in the number of suppliers, as the company uses only the most dependable suppliers, and works closely with them to teach them exactly what specifications are required, including prompt deliveries and near-zero defects. An increase in carrying costs (choice a) would not result, since the goal is to reduce the amount of inventory carried. Fewer deliveries (choice c) would not result, since JIT often increases the number of deliveries, with each one containing a smaller number of units than previously. A greater need for inspection (choice d) would not result since JIT includes teaching the suppliers exactly what specifications are required, including near-zero defects. Less need for linkage with the vendor (choice e) would not result, since JIT involves greater linkage so that orders may be placed and received as quickly as possible.

Just-In-Time (JIT) seeks to minimize inventories with frequent, smaller purchases.

- Long-term relationships with fewer suppliers
- Suppliers are selected for quality and reliability
- Demand-pull – order inventory when needed

RATIO ANALYSIS

Ratios are used to examine trends for a given company, for projecting into the future, and for comparing against other companies or industry averages.

Liquidity is a measure of the nearness to cash. **Solvency** is the long-term ability to pay liabilities when they mature.

Financial flexibility is the ability to react and adjust to problems and opportunities.

Working Capital Components

Working Capital: Current Assets - Current Liabilities

Acid-Test Ratio: $(\text{Cash} + \text{Temporary Investments} + \text{Net Receivables}) \div \text{Current Liabilities}$

Measures The Firm's Ability To Pay Off Its Short-Term Debt From Its Most Liquid Assets.

Current Ratio: $\frac{\text{Current Assets}}{\text{Current Liabilities}}$

The Most Commonly Used Measure Of Near-Term Solvency.

Example: Assuming a current ratio of 3:1, paying off \$1 of accounts payable has what effect on:

Current Ratio? Working Capital?

Answers:

--Current Ratio --

Make up any numbers that give you a current ratio of 3 to 1. Let's use current assets = \$6 and current liabilities = \$2 giving us a current ratio as follows:

$$\frac{\text{Current Assets}}{\text{Current Liabilities}} \times \frac{\$6}{\$2} = 3$$

If we take \$1 of current assets to pay off \$1 of current liabilities, the ratio becomes:

$$\frac{\$6 - \$1}{\$2 - \$1} = \frac{\$5}{\$1} = 5$$

Thus the current ratio goes up.

--Working Capital --

Using the same numbers the working capital is currently:

$$\text{Current Assets} - \text{Current Liabilities} = \$6 - \$2 = \$4$$

If we take \$1 of current assets to pay off \$1 of current liabilities, then the working capital becomes:

$$\$5 - \$1 = \$4$$

Thus working capital stays the same.

Asset Management Ratios (Activity ratios)—How well is the firm using its assets to generate revenue and income? When balance sheet amounts are compared with income statement amounts, the balance sheet amounts should be converted to an average for the year.

Inventory turnover ratio -

$$(\text{Cost of sales}) / (\text{Average inventory})$$

Number of days of inventory or days' sales in average inventory or inventory turnover in days --

$$(\text{Selling days in year [365, 360, or 300]}) / (\text{Inventory turnover ratio})$$

or

$$(\text{Average inventory}) / (\text{Average cost of sales per day})$$

Receivables turnover ratio --

$$(\text{Net credit sales}) / (\text{Average gross accounts receivable})$$

Average Collection Period (Number of days of receivables or days' sales in average receivables) shows the average number of days required to collect:

(Selling days in year [365, 360, or 300]) / (Receivables turnover ratio)

or

(Average gross accounts receivable) / (Average daily sales)

(Average daily sales = net credit sales / number of selling days in the period.)

Return on total assets:

(Net income after interest and taxes) / (Average total assets)

Debt ratio or debt to total assets - the percentage of funds provided by creditors:

(Total liabilities) / (Total assets)

Debt-equity ratio compares resources provided by creditors with those provided by shareholders:

(Total liabilities) / (Shareholders' equity)

Gross Profit Margin = $\frac{\text{Gross Profit}}{\text{Sales}}$

Gross Profit is affected by

- 1) inventory costing method – FIFO, LIFO
- 2) revenue recognition method – installment sales method, cost recovery method, percentage of completion versus completed contract methods, and other variations.

Opportunity Cost – the lost benefit of the next best use of capital.

***Now your time is best spent going through the following multiple-choice questions.**

Chapter Nine—Financial Statement Implications of Liquid Asset Management

Multiple Choice Questions

1. An automated clearinghouse (ACH) electronic transfer is a(n)
 - a. electronic payment to a company's account at a concentration bank.
 - b. check that must be immediately cleared by the Federal Reserve Bank.
 - c. computer-generated deposit ticket verifying deposit of funds.
 - d. check-like instrument drawn against the payor and not against the bank.
2. A lock-box system
 - a. accelerates the inflow of funds.
 - b. reduces the need for compensating balances.
 - c. provides security for late night deposits.
 - d. reduces the risk of having checks lost in the mail.
3. Which one of the following would increase the working capital of a firm?
 - a. Cash collection of accounts receivable.
 - b. Refinancing of accounts payable with a two-year note payable.
 - c. Purchase of equipment financed by a thirty-year mortgage payable.
 - d. Cash payment of accounts payable.
4. Which group of ratios would be useful in evaluating the effectiveness of working capital management?
 - a. Profit margin, acid-test ratio, and return on assets.
 - b. Acid-test ratio, inventory turnover ratio, and average collection period ratio.
 - c. Inventory turnover ratio, times interest earned, and debt-to-equity ratio.
 - d. Acid-test ratio, current ratio, and return on equity.
5. When a company offers credit terms of 2/10, net 30, the annual interest cost, based on a 360-day year, is
 - a. 24.0%.
 - b. 24.5%.
 - c. 35.3%.
 - d. 36.7%.
6. An organization would usually offer credit terms of 2/10, net 30 when
 - a. most competitors are offering the same terms, and the organization has a shortage of cash.
 - b. the organization can borrow funds at a rate less than the annual interest cost.
 - c. the cost of capital approaches the prime rate.
 - d. most competitors are not offering discounts, and the organization has a surplus of cash.
7. The result of the economic order quantity formula indicates the
 - a. annual quantity of inventory to be carried.
 - b. annual usage of materials during the year.
 - c. safety stock plus estimated inventory for the year.
 - d. quantity of each individual order during the year.
8. Using a 360-day year, what is the opportunity cost to a buyer of not accepting terms 3/10, net 45?
 - a. 55.67 percent.
 - b. 31.81 percent.
 - c. 15.43 percent.
 - d. 95.24 percent.
9. A company has daily cash receipts of \$150,000. The treasurer of the company has investigated a lockbox service whereby the bank that offers this service will reduce the company's collection time by four days at a monthly fee of \$2,500. If money market rates average four percent during the year, the additional annual income (loss) from using the lockbox service would be
 - a. \$6,000.
 - b. \$(6,000).
 - c. \$18,000.
 - d. \$12,000.

10. Starrs Company has current assets of \$300,000 and current liabilities of \$200,000. Starrs could increase its working capital by the
- prepayment of \$50,000 of next year's rent.
 - refinancing of \$50,000 of short-term debt with long-term debt.
 - acquisition of land valued at \$50,000 through the issuance of common stock.
 - purchase of \$50,000 of temporary investments for cash.

11. Shaw Corporation is considering a plant expansion that will increase its sales and net income. The following data represents management's estimate of the impact the proposal will have on the company.

	<i>Current</i>	<i>Proposal</i>
Cash	\$ 100,000	\$ 120,000
Accounts payable	350,000	430,000
Accounts receivable	400,000	500,000
Inventory	380,000	460,000
Marketable securities	200,000	200,000
Mortgage payable (current)	175,000	325,000
Fixed assets	2,500,000	3,500,000
Net Income	500,000	650,000

The effect of the plant expansion on Shaw's working capital would be a(n)

- decrease of \$150,000.
- decrease of \$30,000.
- increase of \$30,000.
- increase of \$120,000.

12. Net working capital is the difference between

- current assets and current liabilities.
- fixed assets and fixed liabilities.
- total assets and total liabilities.
- shareholders' investment and cash.

13. If a firm's credit terms require payment with 45 days but allow a discount of 2 percent if paid within 15 days (using a 360-day year), the approximate cost/benefit of the trade credit terms is

- 2 percent.
- 16 percent.
- 48 percent.
- 24 percent.

14. The optimal level of inventory would be affected by all of the following EXCEPT the

- usage rate of inventory per time period.
- cost per unit of inventory.
- current level of inventory.
- cost of placing an order for merchandise.

15. A firm's current ratio is 2 to 1. Its bond indenture states that its current ratio cannot fall below 1.5 to 1. If current liabilities are \$200,000, the maximum amount of new short-term debt the firm can assume in order to finance inventory without defaulting is

- \$200,000.
- \$66,667.
- \$266,667.
- \$150,000.

16. All of the following are inventory carrying costs EXCEPT

- storage.
- insurance.
- opportunity cost of inventory investment.
- inspections.

17. All of the following are valid reasons for a business to hold cash and marketable securities EXCEPT to

- satisfy compensating balance requirements.
- maintain adequate cash needed for transactions.
- meet future needs.
- earn maximum returns on investment assets.

18. An example of a carrying cost is

- disruption of production schedules.
- quantity discounts lost.
- handling costs.
- obsolescence.

19. If a retailer's terms of trade are 3/10, net 45 with a particular supplier, what is the cost on an annual basis of not taking the discount? Assume a 360-day year.

- 24.00 percent.
- 37.11 percent.
- 36.00 percent.
- 31.81 percent.

20. Which one of the following would increase the working capital of a firm?
- Refinancing a short-term note payable with a two-year note payable.
 - Purchase of a new plant financed by a 20-year mortgage.
 - Cash collection of accounts receivable.
 - Payment of a 20-year mortgage payable with cash.

21. The Stewart Co. uses the Economic Order Quantity (EOQ) model for inventory management. A decrease in which one of the following variables would increase the EOQ?
- Annual sales.
 - Cost per order.
 - Safety stock level.
 - Carrying costs.

22. When the Economic Order Quantity (EOQ) model is used for a firm which manufactures its inventory, ordering costs consist primarily of
- insurance and taxes.
 - obsolescence and deterioration.
 - storage and handling.
 - production set-up.

23. Which one of the following statements concerning cash discounts is CORRECT?
- The cost of not taking a 2/10, net 30 cash discount is usually less than the prime rate.
 - With trade terms of 2/15, net 60, if the discount is not taken, the buyer receives 45 days of free credit.
 - The cost of not taking the discount is higher for terms of 2/10, net 60 than for 2/10, net 30.
 - The cost of not taking a cash discount is generally higher than the cost of a bank loan.

24. Shown below is a forecast of sales for Cooper Inc. for the first four months of 1996 (all amounts are in thousands of dollars).

	<u>1996</u>			
	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>
Cash sales	\$ 15	\$ 24	\$ 18	\$ 14
Sales on credit	100	120	90	70

- On average, 50 percent of credit sales are paid for in the month of sale, 30 percent in the month following the sale, and the remainder is paid two months after the month of sale. Assuming there are no bad debts, the expected cash inflow for Cooper in March is
- \$138,000.
 - \$122,000.
 - \$119,000.
 - \$108,000.

25. Edwards Manufacturing Corporation uses the standard Economic Order Quantity (EOQ) model. If the EOQ for Product A is 200 units and Edwards maintains a 50-unit safety stock for the item, what is the AVERAGE inventory of Product A?
- 250 units.
 - 150 units.
 - 125 units.
 - 100 units.

26. Foster Inc. is considering implementing a lock-box collection system at a cost of \$80,000 per year. Annual sales are \$90 million, and the lock-box system will reduce collection time by 3 days. If Foster can invest funds at 8 percent, should it use the lock-box system? Assume a 360-day year.
- Yes, producing savings of \$140,000 per year.
 - Yes, producing savings of \$60,000 per year.
 - No, producing a loss of \$20,000 per year.
 - No, producing a loss of \$60,000 per year.

27. As a company becomes more conservative in its working capital policy, it would tend to have a(n)
- decrease in its acid-test ratio.
 - increase in the ratio of current liabilities to noncurrent liabilities.
 - increase in the ratio of current assets to units of output.
 - increase in funds invested in common stock and a decrease in funds invested in marketable securities.

28. A working capital technique that increases the payable float and, therefore, delays the outflow of cash is
- concentration banking.
 - a draft.
 - Electronic Data Interchange (EDI).
 - a lock-box system.

29. If a firm increases its cash balance by issuing additional shares of common stock, working capital
- remains unchanged and the current ratio remains unchanged.
 - increases and the current ratio remains unchanged.
 - increases and the current ratio decreases.
 - increases and the current ratio increases.
30. The amount of inventory that a company would tend to hold in stock would increase as the
- sales level falls to a permanently lower level.
 - cost of carrying inventory decreases.
 - variability of sales decreases.
 - cost of running out of stock decreases.
31. Which one of the following transactions does not change the current ratio and does not change the total current assets?
- A cash advance is made to a divisional office.
 - A cash dividend is declared.
 - Short-term notes payable are retired with cash.
 - A fully-depreciated asset is sold for cash.
32. Clauson Inc. grants credit terms of 1/15, net 30 and projects gross sales for next year of \$2,000,000. The credit manager estimates that 40 percent of their customers pay on the discount date, 40 percent on the net due date, and 20 percent pay 15 days after the net due date. Assuming uniform sales and a 360-day year, what is the projected days sales outstanding (rounded to the nearest whole day)?
- 20 days.
 - 24 days.
 - 27 days.
 - 30 days.
33. Garo Company, a retail store, is considering foregoing sales discounts in order to delay using its cash. Supplier credit terms are 2/10, net 30. Assuming a 360-day year, what is the annual cost of credit if the cash discount is NOT taken and Garo pays net 30?
- 20.0 percent.
 - 24.0 percent.
 - 24.5 percent.
 - 36.7 percent.
34. Which one of the following transactions would increase the current ratio and decrease net profit?
- Vacant land is sold for less than the net book value.
 - A long-term bond is retired before maturity at a discount.
 - A stock dividend is declared.
 - Uncollectible accounts receivable are written off against the allowance account.
35. Which one of the following statements is MOST correct if a seller extends credit to a purchaser for a period of time longer than the purchaser's operating cycle? The seller
- will have a lower level of accounts receivable than those companies whose credit period is shorter than the purchaser's operating cycle.
 - is, in effect, financing more than just the purchaser's inventory needs.
 - can be certain that the purchaser will be able to convert the inventory into cash before payment is due.
 - is, in effect, financing the purchaser's long-term assets.
36. Which one of the following would NOT be considered a carrying cost associated with inventory?
- Shipping costs.
 - Insurance costs.
 - Cost of capital invested in the inventory.
 - Cost of obsolescence.
37. Newman Products has received proposals from several banks to establish a lockbox system to speed up receipts. Newman receives an average of 700 checks per day averaging \$1,800 each, and its cost of short-term funds is 7 percent per year. Assuming that all proposals will produce equivalent processing results and using a 360-day year, which one of the following proposals is optimal for Newman?
- A \$0.50 fee per check.
 - A fee of 0.03 percent of the amount collected.
 - A compensating balance of \$1,750,000.
 - A fee of \$0.35 per check plus 0.01 percent of the amount collected.
38. Green Co. has an inventory conversion period of 80 days and annual revenue of \$4,200,000. How many times per year (360 days) does Green turn over its inventory?
- 2.25
 - 4.30
 - 4.50
 - 9.00

Chapter Nine—Financial Statement Implications of Liquid Asset Management

Solutions to Multiple Choice Questions

1. (a) is the correct answer. An automated clearinghouse (ACH) electronic transfer is an electric payment to a company's account at a concentration bank.

2. (a) is the correct answer. A lockbox system accelerates the inflow of funds. A company has numerous locations throughout their servicing area which will receive payments and are immediately deposited in the company's bank accounts, thereby speeding the availability of the funds. Answer (b) is incorrect because a lockbox system does not reduce the need for compensating balances. Answer (c) is incorrect because a lockbox system has nothing to do with security for late night deposits. Answer (d) is incorrect because a lockbox system does not reduce the risk of having checks lost in the mail. Checks are still sent in the mail to the various locations within the servicing area.

3. (b) is correct. Working capital would increase if a firm refinances accounts payable with a two year note payable. Answer (a) is incorrect because working capital would not change when cash collected from accounts receivable. The assets would go up and down by the same amount. Answer (c) is incorrect because working capital would not be affected by a purchase of equipment financed by 30 year mortgage payable. Answer (d) is incorrect because working capital would not increase when a firm makes a cash payment of accounts payable

4. (b) is correct. The acid test ratio, inventory turnover ratio, and average collection period ratio are all ratios that would be useful in evaluating the effectiveness of working capital management because they each are made up of current assets and current liabilities. Answer (a) is incorrect because profit margin and return on assets are not ratios that would be useful in evaluating the effectiveness of working capital management. Profit margin and return on assets relate to profitability. Answer (c) is incorrect because times interest earned and debt to equity ratio are not ratios that would be useful in evaluating the effectiveness of working capital management because these ratios do not relate to current assets and current liabilities. Answer (d) is incorrect because return on equity is not a ratio that would be useful in evaluating the effectiveness of working capital management because this ratio does not relate to current assets and current liabilities.

5. (d) is the correct answer.

6. (a) is correct. An organization would usually offer credit terms of 2/10 net 30 when most competitors are offering the same terms, and the organization has a shortage of cash.

7. (d) is correct. The result of the economic order quantity formula indicates the quantity of each individual order during the year. Answer (a) is incorrect because the result of the economic order quantity formula is not the annual quantity of inventory carried. Answer (b) is incorrect because the result of the economic order quantity formula is not the annual usage of materials during the year. Answer (c) is incorrect because the result of the economic order quantity formula is not the safety stock plus estimated inventory for the year.

8. (b) is the correct answer. Using a 360-day year, the opportunity cost to a buyer of not accepting terms 3/10, net 45 is 31.81 percent.

$$\frac{360 \text{ days}}{45 - 10} \times \frac{.03}{.97} = 10.285714 \times .0309278 = 31.81\%$$

9. (b) is the correct answer. If money market rates average four percent during the year, the additional annual income (loss) from using the lockbox service would be \$(6,000).

$$\begin{aligned} \text{Increased daily cash receipt} &= \$150,000 \times 4 \text{ days} \\ &= \$600,000 \\ \text{Interest earned on increase} &= \$600,000 \times .04 = \$24,000 \\ \text{Annual fees} &= \$2,500 \times 12 \text{ months} = \$30,000 \\ \text{Net loss} &= + \$24,000 - \$30,000 = (\$6,000) \end{aligned}$$

10. (b) is the correct answer. Working capital is equal to current assets – current liabilities. The refinancing of \$50,000 of short term debt with long term debt decreases current liabilities and increases long term debt. The decrease in short term debt decreases current liabilities causing working capital to go up. Answer (a) is incorrect because the prepayment of \$50,000 of next year's rent increases and decreases current assets, thus causing no change in working capital. Answer (c) is incorrect because the acquisition of land through the issuance of common stock has no effect on current assets or current liabilities, therefore no change in working capital. Answer (d) is incorrect because the purchase of temporary investments for cash increases and decreases current assets, thereby not changing working capital

11. (b) is the correct answer. The calculation of working capital is current assets - current liabilities. The current assets in this question are cash, accounts receivable, inventory and marketable securities. The current liabilities are accounts payable and mortgage payable - current. Under the current situation, the total current assets equal \$1,080,000 and total current liabilities equal \$525,000 which calculates working capital to be \$555,000. Under the proposal the current assets equal \$1,280,000 and the current liabilities equal \$755,000, calculating a working capital equal to \$525,000. Given this, the effect of the plant expansion on Shaw's working capital is a decrease of \$30,000 (\$555,000 - \$525,000).

12. (a) is the correct answer. Net working capital equals current assets minus current liabilities.

13. (d) is the correct answer. If the credit terms are 2/15 net 45, then a company not taking the 2% discount would have an extra 30 days (45 – 15) to use the money. Thirty days divided into a 360 day year equals twelve 30 day periods in a year. Therefore, if it costs 2% to hold the money an additional 30 days, and there are twelve 30 day periods in a year, then the approximate cost/benefit of the trade credit terms is 24% (2% x 12).

14. (c) is the correct answer. The optimal level of inventory would not be affected by the current level of inventory. No matter what current level of inventory a company has, whether they have too much or too little, has no effect on the optimal level of inventory that the organization should have.

15. (a) is the correct answer. The maximum amount of new short-term debt the firm can assume in order to finance inventory without defaulting is \$200,000.

If current liabilities are \$200,000 and the current ratio equals 2, then the current assets equal \$400,000.

$$\frac{\$400,000 \text{ current assets}}{\$200,000 \text{ current liabilities}} = \frac{2}{1}$$

So, to find the maximum amount of borrowing, using short term debt, without falling below the 1.5 current ratio, the following equation is used:

$$\begin{aligned} X &= \text{new borrowings} \\ \frac{\$400,000 + X}{\$200,000 + X} &= \frac{1.5}{1} \quad X = \$200,000 \end{aligned}$$

16. (d) is the correct answer. Inspections are not inventory carrying costs.

17. (d) is the correct answer. To earn maximum returns on investment assets is not a valid reason for a business to hold cash and marketable securities.

18. (d) is the correct answer. An example of a carrying cost is obsolescence.

19. (d) is the correct answer.

$$\begin{array}{rcl} 360 & \times & .03 \\ (45 - 10) & \times & 1.00 - .03 \\ 10.286 & \times & .0309 = .3181 = 31.81\% \end{array}$$

20. (a) is the correct answer. Refinancing a short-term note payable with a two-year note payable would increase the working capital of a firm.

$$\begin{array}{l} \text{Current Assets - Current Liabilities = Working Capital} \\ \text{Assuming CA} = \$10 \text{ and CL} = \$6, \text{ WC} = \$4. (\$10 - \$6 = \$4). \end{array}$$

If a company refinances \$2 worth of short-term notes payable with a two year note payable, working capital would increase. (\$10 - \$4 = \$6).

Answer (b) is incorrect. The purchase of a new plant financed by a 20-year mortgage would not increase the working capital of a firm. WC would stay the same. Answer (c) is incorrect. A cash collection of accounts receivable would not increase the working capital of a firm. WC would stay the same. Answer (d) is incorrect. A payment of a 20-year mortgage payable with cash would not increase the working capital of a firm. WC would decrease.

21. (d) is the correct answer. A decrease in carrying costs would increase the EOQ. A decrease in the denominator (carrying cost) would cause an increase in the EOQ based on the following formula:

$$\text{The EOQ} = \sqrt{\frac{2(\text{demand}(\text{order cost}))}{\text{carrying cost per unit}}}$$

Answer (a) is incorrect. A decrease in annual sales would not increase the EOQ. A decrease in demand would cause the EOQ to decrease. Answer (b) is incorrect. A decrease in cost per order would not increase the EOQ. A decrease in cost per order would cause the EOQ to decrease. Answer (c) is incorrect. A decrease in safety stock level would not increase the EOQ. A decrease in safety stock level would cause the EOQ to decrease.

22. (d) is the correct answer. When the Economic Order Quantity (EOQ) model is used for a firm which manufactures its inventory, ordering costs consist primarily of production set-up.

23. (d) is the correct answer. The cost of not taking a cash discount is generally higher than the cost of a bank loan. This is intentional by the selling company to encourage early payment by customers. Answer (a) is incorrect. The cost of not taking a 2/10, net 30 cash discount is usually more than the prime rate. The annual cost of not taking the discount is approximately 37%.

$$\text{The discount cost} = \frac{360}{(30 - 10)} \times \frac{.02}{(1 - .02)}$$

Answer (b) is incorrect. With trade terms of 2/15, net 60, if the discount is not taken, the buyer receives 45 days of free credit is not correct. The cost of the 45 days of credit is the 2%. Answer (c) is incorrect. The cost of not taking the discount is lower for terms of 2/10, net 60 than for 2/10, net 30. 2% for 50 days (60-10) is lower than paying 2% for only 20 days (30-10) of using the money.

24. (c) is the correct answer. The expected cash inflow for Cooper in March is \$119,000.

50% of credit sales for March	= \$ 90 X 50%	= \$ 45
30% of credit sales for February	= \$120 X 30%	= \$ 36
20% of credit sales for January	= \$100 X 20%	= \$ 20
Cash sales for March		= <u>\$ 18</u>
Total inflows for March (in thousands)		= \$119

25. (b) is the correct answer. The average inventory of Product A is 150 units.

Safety stock (50) + incoming order (200) = 250 units in inventory.

Inventory drops to 50 right before the next order is received.

Therefore average inventory = $(250 + 50) / 2 = 150$

Another way of coming up with the answer is:

Average inventory = $\text{safety stock (50)} + \frac{\text{incoming order}}{2}$

26. (c) is the correct answer. No, Foster should not use the lock-box system, producing a loss of \$20,000 per year.

Daily sales = \$90 million / 360 = \$250,000

3 days reduction in collection time = \$250,000 X 3 = \$750,000 available for investment

At 8%, \$750,000 will earn \$60,000 annually

Earned \$60,000 - lockbox cost of \$80,000 = (\$20,000)

A \$20,000 loss would be incurred if Foster implements the lockbox system. Therefore do NOT use the lockbox system.

27. (c) is the correct answer as a conservative working capital policy results in an increase in working capital. Therefore, current assets increase. Working capital = current assets minus current liabilities. A conservative working capital policy reduces the liquidity risk. Choice (a) is incorrect since a decrease in acid test ratio means that quick assets such as cash, receivables and marketable securities are decreasing in proportion to current liabilities and this results in lower working capital. Choice (b) is incorrect because increases in the ratio of current liabilities to noncurrent liabilities increases liquidity risk, and represents a less conservative working capital policy. Choice (d) is incorrect because as a company becomes more conservative in its working capital policy, it will not increase the funds invested in common stock (long term) and decrease funds invested in marketable securities (short term).

28. (b) is the correct answer since a draft delays the outflow of cash. A draft (check) is a 3-party instrument whereby the drawer orders the drawee to pay a certain sum of money to the payee. Choice (a) is incorrect since concentration banking does not delay the outflow of cash but instead regional banks may become centers for transfer of lockbox receipts. Choice (c) is incorrect since electronic data interchange does not delay the outflow of cash. Choice (d) is incorrect since a lockbox system is used to expedite the receipt of cash.

29. (d) is the correct answer. If a firm increases its cash balance by issuing additional shares of common stock, working capital increases and the current ratio increases. Answer (a) is incorrect. If a firm increases its cash balance by issuing additional shares of common stock, working capital does not remain unchanged and the current ratio does not remain unchanged. Answer (b) is incorrect. If a firm increases its cash balance by issuing additional shares of common stock, working capital does increase but the current ratio does not remain unchanged. Answer (c) is incorrect. If a firm increases its cash balance by issuing additional shares of common stock, working capital does increase but the current ratio does not decrease.

30. (b) is the correct answer. The amount of inventory that a company would tend to hold in stock will increase as the cost of carrying inventory decreases. The larger the investment a firm makes in inventory, the higher the carrying costs. But if carrying costs decrease, the amount of inventory held in stock increases. Answer (a) is incorrect because if sales fall to a permanently low level, the amount of inventory held is adjusted downward accordingly. Answer (c) is incorrect since a company will tend to decrease the amount of inventory in stock as the variability in sales decreases. Answer (d) is incorrect since the company will tend to decrease the amount of inventory in stock as the cost of running out of stock decreases.

31. (a) A cash advance that is made to a divisional office does not change the current ratio or current assets. This is an intracompany transfer which doesn't change any accounts. Answer (b) is not correct. A cash dividend declaration increases current liabilities, thus changing the current ratio. Answer (c) is not correct. The retirement of short-term notes payable using cash reduces the current assets and reduces current liabilities, thus changing the current ratio:

$$\frac{6}{3} \quad 2 \qquad \frac{6-1}{3-1} \quad 2.5$$

Answer (d) is not correct. When a fully depreciated asset is sold for cash, cash increases which increases the current assets which in turn increases the current ratio.

32. (c) The formula for days sales outstanding (days of receivables) is as follows:

$$\frac{(40\% \times 15 \text{ days})}{6} + \frac{(.40 \times 30 \text{ days})}{12} + \frac{(.20 \times 45 \text{ days})}{9} = 27$$

33. (d) The basic formula for calculating the cost of not taking the discount is as follows:

$$\frac{360 \text{ days}}{\text{discount period}} \times \text{interest rate}$$

This simple formula gives an answer that is a little less than the exact correct answer. Therefore, you will need to remember that the exact correct answer is larger than the answer obtained using the above formula. Therefore the answer is calculated as follows:

$$\frac{360 \text{ days}}{(30 - 10)} \times 2\%$$

$$\frac{360 \text{ days}}{20} \times 2\% \quad 36\%$$

So the exact answer is a little more than 36%: 36.7%.

34. (a) If vacant land is sold for less than the net book value, cash will go up which causes the current ratio to increase. In addition if the vacant land is sold for less than book value, there will be a loss causing a decrease in net income. Answer (b) is not correct. A long-term bond retired before maturity at a discount would generate a gain rather than a loss; therefore, the transaction would increase net income. Answer (c) is not correct. A stock dividend that is declared does not affect profit or the current ratio. The journal entry for a stock dividend declaration is as follows:

retained earnings	x	
common stock dividends distributable		x
paid in capital		x

Answer (d) is not correct. An uncollectible accounts receivable that is written off against the allowance account would not affect profit or the current ratio. The journal entry that would be made is as follows:

allowance for doubtful accounts	x	
accounts receivable		x

35. (b) is the correct answer since at the end of the purchaser's operating cycle, he will get the necessary cash from the sale to pay off the supplier. Therefore, if the supplier extends credit for a longer period than the purchaser's operating cycle, he is in effect financing more than the purchaser's inventory needs. Choice (a) is incorrect since the seller will have a higher accounts receivable if the seller extends credit for a longer time period. Choice (c) is incorrect since the seller cannot be sure that the purchaser will convert the inventory to cash before payment is due. Choice (d) is incorrect since the seller is not necessarily financing the purchaser's long-term assets, although the seller is financing more than the purchaser's inventory.

36. (a) All costs associated with the inventory after it arrives at our location are considered a carrying cost associated with the inventory. Shipping costs are not part of the carrying costs of inventory. The other choices are not correct. All costs associated with the inventory after it arrives at our location are considered a carrying cost associated with the inventory.

37. (c) A compensating balance means that the \$1,750,000 must stay in an account and not be used. The exact cost of this alternative equals $1,750,000 \times .07 = 122,500$. Answer (a) is not correct. This is not the least expensive; try again. The cost of this alternative is equal to $700 \text{ checks per day} \times 360 \text{ days per year} \times .50 \text{ fee per check} = 126,000$. Answer (b) is not correct. This is not the least expensive. The cost of this alternative is equal to $700 \text{ checks per day} \times 360 \text{ days per year} \times \$1,800 \text{ average per check} \times .0003 = 136,080$. Answer (d) is not correct. This is not the least expensive. The cost of this alternative is equal to $(700 \text{ checks per day} \times 360 \text{ days per year} \times .35 \text{ fee per check}) + .0001 (700 \text{ checks per day} \times 360 \text{ days} \times \$1,800 \text{ average per check}) = 133,560$.

38. (c) Logic would say that if the conversion period is every 80 days and the year is defined as 360 days, the inventory turnover would be $360 \text{ days} / 80 \text{ days}$, or 4.5 times. Technically, the formula for inventory turnover could be used:

$$\text{Days supply in inventory} = \frac{360}{\text{Inventory Turnover}}$$

Chapter Ten

Information Technology Implications in the Business Environment

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Chapter Ten

Information Technology Implications in the Business Environment

A. Role of Business Information Systems

Reports produced by a business information system should be timely, accurate, useful, understandable, concise, and economical to prepare. They should be relevant to the user, which often means that those higher in the organization need summarized information, while those in lower positions need more detailed information.

The timing of reports may be periodic (i.e., every week, month, etc.), on demand (only when requested), or event-triggered (caused to be produced when something happens).

They could be detailed (showing everything), summarized (showing only subtotals and grand totals), or exception-oriented (showing, for example, only the customers who are past due in their AR balances).

And, in format, they could be tabular (rows and columns), graphic, or narrative. Another choice is to make them in hard copy (paper) or “soft copy” (on the monitor).

The **accounting information system** (AIS) is a subsystem of the **management information system** (MIS). MISs include production, finance, marketing, distribution, and personnel functions. MISs provide information and support the daily decision-making needs of management.

Traditionally, AISs include the **transaction processing systems**, or **transaction cycles**. These include budgeting and responsibility reporting systems. The main transaction processing systems are:

- Revenue – Taking the customer’s order, shipping the goods or providing the services, billing, and collecting the cash
- Expenditure – Requesting goods/services, purchasing, receiving, and paying
- Conversion – Converting resources purchased into goods/services available for sale, usually including assessing requirements, scheduling and initiating production, issuing materials, and then producing
- General ledger – Receiving transactions produced by the above three transaction cycles, recording necessary adjustments, and producing financial and managerial reports

Each of these systems is subject to **risks**. There are, for example ...

- Strategic risks – doing the wrong things
- Operating risks – doing the right things, but the wrong way
- Financial risks – having financial resources lost, wasted, or stolen, or incurring unnecessary liabilities, through such as lack of physical control over assets, extension of credit to a customer who has no ability to pay, and payment by unauthorized employees to unapproved vendors
- Information risks – receiving or producing incomplete or inaccurate information, unreliable hardware or software, and unauthorized access

By way of definition, **hardware** is the physical equipment used in the computer system. **Software**, however, is the computer program that gives instructions to the central processing unit (CPU). Often, software is broadly used to include programming languages and system **documentation**.

Popular forms of documentation which depict graphical representations of systems include:

- Data flow diagram – showing the sources and destinations of data and the flow of that data into and out of processes performed on the data, as well as data stores (files). Unlike flowcharts, which depict how the data physically flow and the types of media used, data flow diagrams depict merely what data are flowing logically.
- Document flowchart – showing the flow of documents and information between departments or participants in the system. There is usually a column for each participant.
- System flowchart – showing the relationship among inputs, processing, and outputs in a system.
- Program flowchart – showing the sequence of operations that a computer performs in executing a program.

In designing systems, there are several principles:

The compatibility principle – systems must be compatible with their environments, through the interface / boundary with other systems, receiving inputs and producing outputs for other systems.

The flexibility principle – systems must be able to adapt to changes and new demands.

The control principle – systems must have sufficient controls (see next session on controls). They must have a “requisite variety” of controls to protect against the variety of problems that could lead to entropy (disorder).

Accountants are involved with systems as designers, as auditors, and/or as users.

Accountants should be involved in the coding of data such as the chart of accounts, or inventory ID’s. Codes may be:

- **Sequential** (to highlight missing items, e.g., for coding check numbers or invoice numbers)
- **Block** (reserving blocks of numbers, e.g., reserving the 100 to 199 block of numbers for coding current assets, 200 to 299 for fixed assets, etc.)
- **Group** (dividing the entire code into subsections, or subgroups; thus, for inventory, the first 2 digits of the inventory code might indicate the vendor, the next 3 might indicate the color, the next 2 might reveal the location in the warehouse, etc.)
- **Mnemonic** (a memory-jogger, usually an abbreviation, such as, for states, NY for New York, CA for California, etc.)

In selecting a coding scheme, you must consider the organization’s information requirements, the organization’s complexity, and you must allow space in the code for organizational growth.

While the **Financial Reporting System** communicates information primarily with external parties, the **Management Reporting System** provides internal information to management. Management must deal immediately with business problems, as well as plan and control operations. So management would need budgets, variance reports, cost-volume-profit analyses, and non-GAAP formats. Directing management’s attention to problems on a timely basis is important to internal control, for monitoring purposes.

DECISION SUPPORT SYSTEMS (DSSs)

DSSs assist management in unstructured or semi-structured decisions, as opposed to structured (repetitive, routine, perhaps programmable) ones.

They may suggest choices for long-range, strategic planning decisions, but active managerial insights and judgments are required. They enable the end user to initiate and operate the system for ad hoc, quick responses.

DSSs contain –

- Relevant, specialized databases (e.g., historical data about the company)
- Model bases (e.g., regression analysis, net present value) for analysis, with high-level (“natural”) languages (e.g., English)
- Supportive, interactive user interfaces (e.g., GUI – graphical user interface)
- Variety of outputs (e.g., reports, graphs)

ARTIFICIAL INTELLIGENCE SYSTEMS

Expert systems are the most widely used form of artificial intelligence (AI). They can suggest expert decision choices to the inexperienced, containing a knowledge base, a database, and an inference engine for if-then conditions. Generalized shells are available, into which the company must input its particular knowledge and data. Expert systems are software programs that use facts, knowledge, and reasoning techniques to solve complex problems. They assure consistency with the decisions of the company authorities and are available 24 hours per day, 7 days per week.

CPA firms have developed expert systems to help their employees properly value a loan portfolio, for example, or to do tax planning, or to guide audit decision-making.

Less widely-used forms of AI include –

- Fuzzy logic (e.g., search engines, that look for words that are spelled similar to, but not exactly like, other words)
- Neural networks (finding patterns among attributes, such as weather patterns that result in severe storms)

ENTERPRISE RESOURCE PLANNING SYSTEMS (ERPs)

ERP systems run a company’s applications. By way of definition, stand-alone application software would be a program that performs the data processing tasks the company requires, such as purchasing, payroll, or accounts receivable. ERP is integrated application software, combining many of these subsystems.

ERPs are ultra-high end, expensive accounting software systems, intended to integrate all aspects of an organization’s activities into one system. They are multi-module systems designed to create a seamless flow of information throughout the organization. SAP, Oracle, and PeopleSoft sell popular ERP systems.

OLTP – Online Transaction Processing applications – support the daily processing of mission-critical transactions in a company’s ERP. Its shared, enterprise-wide operations database is volatile, with a large number of relatively simple transactions per day in finance, sales, distribution, expenditure, production planning, and logistics.

OLAP – Online Analytical Processing applications – include decision support tools for management. Its database is the data warehouse, drawn regularly from the OLTP database, and designed for complex, read-only queries and data mining – drill-down, roll-up (consolidate), and slicing & dicing data to view it in various dimensions (e.g., sales by day, by week, by product, by customer).

Because ERPs may not contain every application a given company needs, the company may still need its old legacy systems, or bolt-on industry-specific applications from other vendors.

B. Roles and Responsibilities Within the IT Function

In traditional manual systems, we sought to separate the functions of authorization of a transaction, recording of the transaction, and custody of the assets associated with the transaction. That way, no single employee could both perpetrate and conceal fraud or intentional errors. However, since functions previously separated are usually combined in integrated computerized information systems, it is now critical to prevent any person from having unrestricted access to the computer, its programs, and live data. To prevent an individual from both perpetrating and concealing a fraud, authority and responsibility should be clearly divided among the following functions:

- Systems administration – ensuring that the different parts of an information system operate smoothly and efficiently
- Network management - taking responsibility for the operation and reliability of the company’s internal and external networks, assuring that all devices are appropriately linked and remain up and running, that messages are received as sent, and that response times are minimized.
- Security management – ensuring that all aspects of the system are secure and protected from internal and external threats.
- Change management – ensuring smooth and efficient changes in the system, preventing errors and fraud.
- Users – recording transactions, authorizing data to be processed, and using system output.
- Systems analysis – helping users determine their information needs and then designing (perhaps with specialized “systems designers”) an information system to meet those needs.
- Application programming – writing and/or maintaining application programs, such as payroll, accounts receivable, purchasing, and other company applications, based on the design of the systems analysts.
- Systems programming – writing and/or maintaining system programs, such as the operating systems for the workstations and the network operating systems.
- Computer operations – operating the machines, running the software, processing transactions and responding to system messages. Operators ensure that data are properly input to the computer, processed correctly, and that needed output is produced. It is vital that operators not also be programmers, as that would be most incompatible.
- Information systems library – maintaining custody of the data, the source programs (in the language written by the programmers), and the object programs (in their executable, machine-language form). They may control physical media (tapes, disks, etc.), and/or they may control access to the programs and data as stored using password protection.
- Data control – this group ensures that source data have been properly approved, and then monitors the processing, reconciling input and output. It also monitors input errors to ensure their correction and resubmission, and it distributes output.
- Database Administration – The DBA is responsible for the maintenance, protection, control, and integrity of the database. The DBA creates the overall schema (layout) of the database, defines each user’s subschema (personal view or authorized access domain), assigning degrees of access to individual records, monitoring usage, and planning for future expansion.
- Web Administration – The Web administrator maintains the company’s virtual public face on the computer screen, so that customers, potential customers, and any other stakeholders will have a positive experience interacting with the Web site. The Web site must remain up and running, protected, with minimal response delays.

C. IT Fundamentals

1. Hardware, Software, and Data Organization

OPERATING SYSTEMS

Most people are familiar with a version of Microsoft's Windows as their operating system. There are others also, such as Unix, Linux, OS/2, and Apple's Macintosh. Among the responsibilities of the operating system is the **allocation of computer resources** (processors, main memory, printers, etc.) to applications, as well as the **scheduling** of the applications. Thus, it is critical that the operating system (OS) **protect** itself and its users.

For security, the OS should have a **log-on procedure**, requiring a user ID and password. Sometimes, there is then created an **access token** containing key information about the user and his privileges. The OS might include as well an **access control list** defining access privileges for each valid user for all system resources.

System audit trails record activity at the system level. They may include **keystroke monitoring**, recording every key pressed by every user. Or they may involve simply **event monitoring**, listing activities executed, the user ID, and the starting/stopping times.

PROGRAMMING LANGUAGES

Software is written in a programming language. When computers were first invented, all programs were written in **first-generation language**, or machine language, instructing the computer precisely what to do, such as what piece of data (the precise numerical location in internal memory and the number of bytes/bits) to be moved to what other location, or to be moved to which internal register to be subtracted from other data that had already been moved to that register. And all of this was written in binary code. Eventually, language translators (**assemblers, compilers, and interpreters**) were invented to translate from the more natural language (the "source program") into machine language for execution (the "object program" or "load module").

Second-generation language – This was an assembler language, which was essentially a one-for-one mapping into machine language instructions from a form that allowed the programmer to use mnemonic abbreviations representing binary-coded instructions.

Third-generation languages – These were actual rudimentary sentences, that could be compiled or interpreted into machine language procedures. They were thus also called procedure-oriented languages, and included FORTRAN, COBOL, BASIC, C, AND PL1.

Fourth-generation languages – These are even more powerful, such as SQL (Structured Query Language) for querying a database.

Event-driven languages – Here we have moved beyond procedural languages, since the program is not executed every time in the programmer's specified sequence. Instead, the user may alter the flow according to events that he might initiate, by clicking an icon. Languages that allow humans to interface with the computer through screen icons allow **GUI (graphical user interfaces)**.

Object-oriented languages – Here, languages like Java manipulate objects, which are software packets containing both data and instructions.

FILES, AND DATABASE MANAGEMENT SYSTEMS (DBMSs)

Until recently (and even now, to a large extent), all companies organized their data into **files**, such as the customer master file. That file would be **composed of** –

- Records (e.g., one record for each customer), which would be composed of
- Fields (e.g., the customer name field, or the customer zip code field) which would be composed of
- Bytes, or characters/digits, which would be composed of
- Bits, the binary ones and zeroes a computer uses to represent data.

Files may be **organized** in the following ways:

- **Sequential**, in which all records are in sequence, according to their primary keys (e.g., by customer number for a customer file). Sequentially organized files are efficient for updating or processing an entire master file with a batch of current transactions.
- **Indexed**, in which records may be retrieved by the operating system's searching through a file's index for the primary key, and the index will provide the disk address, just as an index in the back of a book refers you from a key word to a page number.
- **Randomized**, in which a "**hashing scheme**" or algorithm performed on the primary key provides the disk address. For example, the operating system will divide the key into a number, and the remainder that results from that division will be the disk address of the record with that key. Randomized files provide very fast access for querying particular records.

Files are stored on **secondary storage** devices, such as –

- **Tape**, if **sequential** access only is needed
- Magnetic **disk**, or CD, DVD, if **direct** or random access is needed

Primary storage consists chiefly of RAM (random access memory) where data and programs are temporarily stored during processing, but it also contains ROM (read-only memory) and cache (very fast-access temporary memory for frequently used items).

Now, database management systems – DBMSs – (software enabling users to create, modify, and utilize an organization's information, previously stored on multiple separate files) are quite popular, providing:

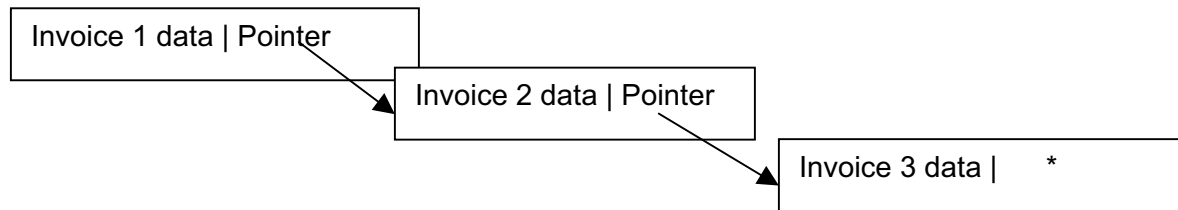
- Data independence (data exist independent of any particular application, and can be used by any application that is authorized. Thus, for example, "quantity-on-hand" for an inventory item may be used by both the purchasing and the inventory control applications, but is stored and maintained only once.)
- Reduced data redundancy (each data item is stored only once, regardless of how many applications use it)
- Accessibility of data by many users, flexibility in designing new forms of output that may draw on different data
- Organizational cooperation, since one user must be careful not to erroneously change data used by others
- Vulnerability. This is a disadvantage, as the reduced redundancy and the accessibility by many users do require special precautions, such as passwords, frequent back-ups of the database, and transaction logs (files) of each change made to an item of data.

DBMSs include data description language and data manipulation language to facilitate the design, querying, input, and reporting of data. Structured query language (SQL) is a standard, text-based, programming language using keywords "select," "from," and "where," to retrieve data.

The database administrator designs and controls the data dictionary (where each data item in the database is defined and explained), the overall schema (blueprint or layout), and each user's individual view (subschema).

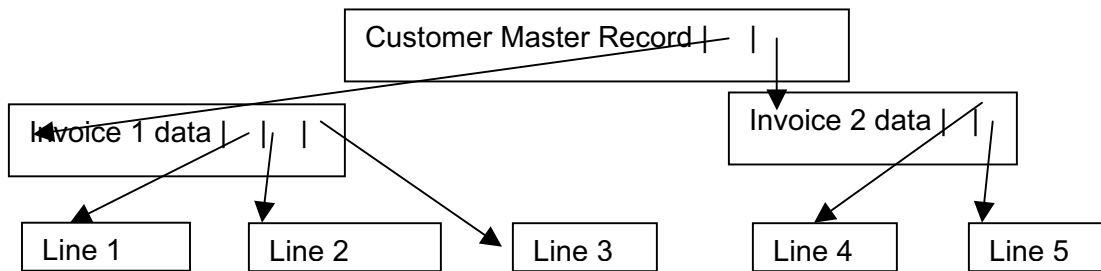
DIFFERENT DATABASE SCHEMA DESIGNS

CHAIN (LINKED LIST)



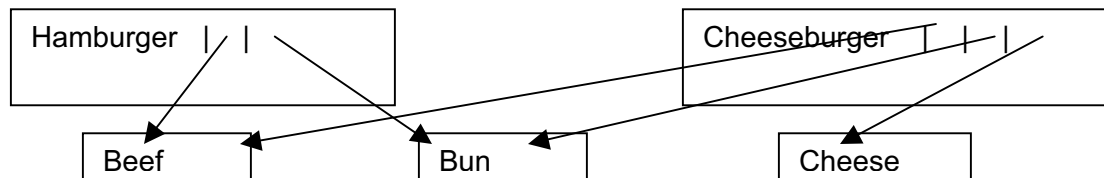
In this example, each record contains data about the invoice, and a “pointer.” By “pointer,” we mean that the physical disk address (or some number from which the disk address may be easily derived) of another record is stored within the first record. So here, the first record contains necessary data fields about Invoice 1 (e.g., invoice number, date, amount) and also contains a field which points to the next invoice in the chain of invoices outstanding for that customer. The asterisk (*) at the end indicates nothing further to which to point. The Chain schema is more like a flat-file than a database, as it is a one-to-one configuration, or “**cardinality**.” The cardinality is the nature and extent of the relationships among the records of the database.

TREE (HIERARACHY) (ONE-TO-MANY “CARDINALITY”)



Here, one “parent” record may have many pointers – “children” – and each child may have its own children records. So the customer record points to (contains the disk addresses of) the invoices outstanding for that customer. In turn, each invoice record points to the inventory line items billed on that invoice.

NETWORK (MANY-TO-MANY “CARDINALITIES”)



Here, one “parent” record (finished good record) may point to many “children” records (raw material records). Moreover, a given child may have many (more than one) parents. And redundancy is reduced, because a given raw material record need exist in only one place, while being pointed to by many finished goods records. Records may be physically dispersed, but logically connected.

The three previous schema designs are “navigational” models, where the user must navigate pre-defined “structured” paths, with embedded pointers. The user must know the structure, and the database may be accessed only along the pre-defined (and thus inflexible) path.

This is different from the – **RELATIONAL MODEL**

PARTS

<u>PARTNO</u>	<u>PARTNAME</u>
P1032	WHATZIT
P1048	FRAMMIS
P1079	GIZMO
P1083	WHACHACALLIT

SUPPLIERS

<u>SUPPNO</u>	<u>SUPPNAME</u>	<u>SUPPADDRESS</u>
S129	Joe's Junk	23 Main St. Mytown, State
S234	Sam's Stuff	1 Chestnut Yourtown, State
S386	Gary's Garage	3 Broadway Histown, State

PRICES – PARTS BY SUPPLIER

<u>PARTNO</u>	<u>SUPPNO</u>	<u>PRICE</u>
P1032	S234	2.39
P1032	S386	2.45
P1048	S129	4.95
P1079	S129	1.67
P1079	S234	1.89
P1079	S386	1.95
P1083	S129	3.12
P1083	S386	3.08

The relational model keeps its data in multiple separate tables (rows & columns) using no explicit pointers. Instead, relationships may be formed on an ad hoc basis as needed. A supplier’s address need be stored and maintained in only one place, even though that supplier may provide many parts. Similarly a given part may be supplied by many different suppliers, so many-to-many cardinalities are supported, but may require a linking table (parts-by-supplier in this case). The linking table has a composite primary key, partno-suppno in this case. A different linking table may relate parts to finished goods, or to customers who buy them. So there is great flexibility in the relational schema, where many different paths may co-exist.

In the relational model, tables are **normalized**, resulting in more tables but fewer columns in each one, as each individual table refers to only a single concept. This will reduce redundancy and possible **anomalies**. Anomalies are types of inconsistencies which would exist if you had everything stored in one large table, for example, with one row per part and all the information about that part on that row. Then, if an inventory part were deleted, you would also delete all the information about the supplier (the delete anomaly) if you purchase only that one part from that supplier. Or, you may have the supplier’s address listed next to each part that supplier supplies, requiring many updates, one or more of which might be neglected (the update anomaly), if the supplier moves. Or, you may not be able to insert a new supplier until you purchase something from him (the insert anomaly). So, if you imagine that everything is initially stored in one large table, normalization involves systematically decomposing it into a set of tables eventually in “third normal form (3NF).” In third normal form, the database is free of anomalies. The database designer systematically eliminates repetitions and unnecessary dependencies, reducing the number of columns (fields, attributes) in the table and instead spinning off additional tables, moving through 1NF, 2NF, and finally to 3NF.

The relational DBMS can enforce **referential integrity**. The reference to supplier S234 in the parts-by-supplier table has integrity, because there is such a supplier in the suppliers table.

2. Systems Operations and Processing Modes

Many transaction processing systems use **batch processing**, in which transactions are accumulated into groups or batches for processing at some regular interval (e.g., daily, weekly, monthly). These batches of transaction records are usually sorted into the same sequence as the master file records before processing against the master file. Hence, 3 physical files are involved: the transaction file, the old (or current) master file, and the new (or updated) master file.

Batch processing is appropriate for applications with high activity ratio – that is, a high percentage of records in the master file are affected by each update run. Payroll is a good example.

The other chief mode is **on-line processing**, in which individual transactions are processed as they are received, usually at their point of origin. On-line **real-time processing** processes transactions immediately as they happen (or are captured), providing updated information to users on a timely basis.

On-line real-time processing is appropriate for applications with high volatility – that is, there are many changes to the file per hour.

Let's consider the phases involved in the batch processing of a payroll application, as an example. First there would be data capture, in which data from time cards may be keyed in. In more modern systems, data may be captured electronically, when employees swipe their plastic ID cards through a reader. Then, there would be an edit phase, where errors in the input transactions (e.g., missing employee numbers) may be detected. Then, if this is batch processing, the time data transactions would likely need to be sorted by employee number preceding the master file maintenance phase, in which the employee master file is updated with the current period's transactions. In the course of, or following, the maintenance, the reporting phase produces internal reports (such as pay by cost center and payroll register for accounting purposes, labor variances for control, and position control report for management) and external reports (such as taxes withheld).

If there is on-line access, authorized personnel can produce queries, such as lists of employees with certain skills, or ad hoc reports designed by users and produced as needed for a particular purpose.

An audit trail should exist in the payroll (or any other) application, by which transactions may be traced from the original time record to the payroll register, and backwards through the phases.

A telecommunication information system – uses communication technology to move data from distant points.

Distributed data processing (DDP) distributes the processing of the data to users, so that each user can process his own transactions. It may use a centralized database, in which remote users request data and then transmit it back to the central location. Or, it may distribute the database to the users. With distributed data, the system may use a partitioned database, in which each user gets at his local workstation the segment of the database for which he is the primary user. Or, the distributed data may be replicated, where each user gets a complete copy of the database. The replicated database implementation is primarily justifiable simply to support read-only queries, with a high degree of data sharing.

With DDP, we want data concurrency, where each user has access to accurate and up-to-date records. Thus lockout procedures may be necessary, in which software prevents simultaneous accesses to the same data item, where two users may be attempting to change the same record at the same time.

A local area network (LAN) is a linked federation of computers in close proximity (same floor or same building). Each workstation needs a network interface card fitted into one of the PC's expansion slots. Generally, there is (at least) one server to store common software and data.

A wide area network (WAN) is a network more geographically dispersed. It uses bridges to connect same-type LANs, and gateways to connect different types of LANs, or LANs to WANs, or PCs to mainframes.

The **topology** (physical arrangement) may be a star (one server computer in the middle, with an individual link from it to each workstation), a hierarchy (connected like an organization chart), a ring (a circle of equal workstations, also called peer-to-peer), or a bus (a single cable, like a bus going down the street, picking up workstation messages and dropping them off)

Instead of purchasing and maintaining its own transmission media for, say, electronic data interchange with a trading partner, a company may use a VAN (value-added network). This is a public network that adds value to the data communications process by handling the interfacing with multiple types of hardware and software used by different companies, each with its own “mailbox” on the VAN.

Many CPA firms use VPNs (virtual private networks) to allow its associates to use the Internet in a secure, encrypted manner to communicate while working outside the office. The remote worker uses the LAN as if he is in the same office (except for slower response time).

A client-server system distributes processing between a server (a central file storage site which may search for and distribute an individual record requested by a user) and the clients (workstations which may read or update the record). It can work with different topologies. The server stores shared databases and system software, while individual applications (e.g., spreadsheets) and data may reside on the client workstation.

Client-server systems are replacing mainframe systems, because they use cheaper hardware & software, and they are flexible & expandable. Instead of centralizing all data, applications, and expertise, client-server systems distribute them. Empowering users, they also require more skill from users in technology, output design, & controls.

CASE (Computer-aided software engineering) tools are now widely employed to use computer software to build computer software, increasing the productivity of systems professionals. For example, they can take a data flow diagram and lead the developer to create a system based on it.

D. Disaster Recovery and Other Threats and Risk Management

With greater dependence on the Internet or other forms of e-commerce, businesses may run the risk of significant loss of revenue without proper plans for disaster recovery and business continuity.

We need preventive, detective, and corrective controls. Preventive controls are designed to stop errors (or irregularities). Detective controls discover that errors have occurred (perhaps slipping through the preventive controls. And corrective controls help recover from errors (or other problems).

SYSTEMS DEVELOPMENT AND MAINTENANCE CONTROLS

All systems must be properly and formally authorized to ensure economic justification & feasibility.

User specifications must be sought. Users should detail the logical needs that the system must satisfy.

The activities of the systems development life cycle must be followed & documented, to operationalize the user specifications. The phases of the life cycle are:

- Systems planning – aligning proposed projects with the company’s strategy and resources
- Systems analysis – surveying the current system and determining users’ needs
- Conceptual design – diagramming the proposed system’s basic functions, inputs, outputs, and data sources and destinations
- System selection – objectively evaluating feasibility, especially cost-benefit
- Detailed design – modeling the processes, databases, and controls

- System implementation – conversion to the new system
- Maintenance – This is ongoing throughout the life of the system, and there should be modification controls to prevent a programmer (or anyone else) from making unauthorized changes to a program. All proposed changes should be approved, thoroughly tested and documented. Auditors should gain an understanding of the change process, and review a complete set of final documentation materials for recent program changes. The auditor should verify that program changes were identified, listed, approved, tested, and documented. The changes should be implemented by someone independent of the user and programming functions. The auditor can review all programs' access control tables/lists.

The internal audit function should be involved to ensure adequate system controls.

All systems must be completely documented. **Documentation** may be classified as:

- Administrative – how to administer the IT department
- Systems – includes flowcharts and program listings
- Operating – how to input transactions and correct errors

Thorough testing of the programs must occur before implementation. Actual test results are compared with predetermined expectations.

User acceptance testing of the entire system must occur.

In maintenance, all program revisions must have documented need, proper authorization, and thorough testing.

Source program library management system

- This system safeguards source programs, for access by development programmers and by maintenance programmers.
- It enforces password control.
- It has as an objective the separation of the source program test libraries from the application load module library.
- It maintains sequential program version numbers.
- It automatically produces audit trails & management reports
- It has specially controlled access to maintenance commands (e.g., over passwords or version numbers).

HARDWARE CONTROLS

- Restricted physical access (locked doors, guards, limited entry, magnetic cards, biometric ID [e.g., fingerprint, retina, iris], back-ups stored off-site) as well as logical access (passwords). Certainly, these physical access controls are general controls that benefit all applications, and they should not be overlooked.
- Diagnostic routines, in which the computer checks its connections to peripheral devices and internal memory, perhaps, upon starting up.
- Echo checks, in which receiving hardware sends the same message back for comparison
- Tape file protection rings & write-protect tabs on disks, to physically prevent writing.
- Parity checks (extra 9th bit – odd or even parity, added to a byte to make the total number of “on” bits odd or even, whichever is the standard in that installation, so that the 9th bit may be checked upon the next reading)
- Preventive maintenance, to replace older components before they fail
- Fault tolerance, such as ...
 - Redundant arrays of independent disks (RAID) among which data are stored and updated simultaneously on several disks
 - Uninterruptible power supplies providing back-up power in an emergency
 - Multiprocessing, so that a back-up processor is available in case of a failure

PROTECTION OF PROGRAMS AND DATABASES

- User views (subschema) to restrict users to a subset of the entire database
- Database (or file, or device) authorization table (listing, for each file & each user, separate authority to – read, insert, modify, delete)
- Data encrypted when stored
- Software & hardware monitors to detect & report usage of data, programs, and devices (by whom, from where, when, how long, for what)
- Back-ups performed regularly (grandparent-parent-child for sequential batch processing, under which three generations of master files are kept), with back-ups stored securely, off-site. This is helpful in case of disaster or error. Other forms of storage controls include the use of a data librarian.

DISASTER RECOVERY PLAN

Essentially, the plan is based on management's cost-benefit analysis of potential disasters. Its objectives are to minimize the extent of loss, quickly (if temporarily) establish means of processing information, and resume normal operations quickly. Business interruption insurance is necessary, but not sufficient. Steps in developing the plan include:

- Identify “mission-critical” applications, establish the priority for business continuity
- Ensure availability of data, programs, & documentation
 - Database and program copies stored off-site
 - Data recovery procedures, e.g., to bring the most recent database copy to current status by re-processing transactions that have occurred since the back-up
- There should be specific assignments and access to phone numbers of team members, and the order in which they should be called. The major players will have specific responsibilities for arranging for new facilities, operating the computer, installing software, establishing communication capability, recovering vital records, and arranging for supplies.
- Alternative processing:
 - Hot site (completely equipped)
 - Cold site (space available, but not fully equipped)
- Manual operations if no power
- Test the plan (as with a fire drill), and regularly assess the need for revision.

All of these are basically general controls. In addition, application controls (sometimes also called transaction controls or accounting controls) must be incorporated into each application's input, processing, & output. Following are some examples of application controls.

INPUT CONTROLS:

- Edit checks, or validation controls, intended to detect errors in transaction data before the data are processed. These might be designed to check at varying levels of detail.
 - Character – the most detailed, a single character
 - Field – such as a customer number. Examples of field checks are listed below.
 - Record – such as the customer record, containing all of the fields about the customer (e.g., customer number, name, address, etc.). The program might look for unusual interrelationships among the fields in the record. For example, in a relationship check, if an employee is not a salesperson (employee position field), there should be no sales bonus in the pay fields.
 - Array, or file – Is this the correct file? The program could look at the internal label (often the first record on the file) to confirm the file name, version, or date.

Examples of field checks:

- Validity – Is this a valid member of a set, such as a valid customer number?
- Field type – Is this properly numeric, or alphabetic, or a proper date?
- Limit – Is this less than the upper limit, or greater than the lower limit allowed?
- Completeness or missing-data – Is this field incorrectly left blank?
- Echo – When the user types in an account number, the system echoes back on the screen the corresponding account name so that the user can confirm.
- Sequence – The program could look for records incorrectly out of sequence, or for missing numbers in a sequence.
- Sign – A given field, for example, might get an error warning if it becomes negative.
- Self-checking digit – Here an additional, redundant, digit is added to, for example a customer number. For example, a fifth digit might be a number that is computable from the previous four digits when the computer performs an internal algorithm (predefined calculation). Then, if the proper fifth digit is not in agreement with the calculation, the computer signals an error in the input of that field.

- If using paper input documents, they should be prenumbered and well-designed.

- Any errors found should be corrected before posting.

- Batch control totals (record count, financial / amount totals, hash totals) should be verified. These can then be compared to control totals on output.

Record count: The number of records (transactions) in a batch

Financial / amount total: A meaningful total of a batch (total dollars, or total hours worked)

Hash total: A meaningless total in itself (such as total of the social security numbers of employees in a batch). Still, like the other batch totals, it can be useful to detect transactions that were lost, or wrongly included, or incorrectly keyed.

PROCESSING CONTROLS:

- Equality of debits & credits should be checked after posting (trial balances)
- Posting references should be used to provide an audit trail
- Standardized adjusting entries should be used.
- Subsidiary ledgers should be reconciled to the general ledger.

OUTPUT CONTROLS:

- Reports should be reviewed by managers, accountants, and internal auditors. They should not be accessible by anyone not authorized to see them. And paper reports should be shredded before disposal.

E. Implications of Electronic Commerce

ELECTRONIC COMMERCE

E-commerce includes many activities, such as creating a Web site to support investor relations, to advertise products/services, to track orders, to speed delivery along the supply chain. It thus involves all aspects of a company's interactions with its stakeholders. To be successful, e-commerce implementations must support the business's overall strategy, and produce transactions with validity, integrity, and privacy.

EDI (Electronic Data Interchange)

- Between 2 entities (bank, supplier for JIT)
- No paper required
- Compresses the processing (business, cash) cycle
- Controls are essential
- Need common standards ("protocols") among the parties, and data dictionaries defining the fields

EDI may be implemented via dedicated point-to-point private networks, or

Value Added Network or Third Party Network (in which a third party supplies a higher quality connection providing users with a mailbox, facilitating batch processing, once or several times per day)

Major risks associated with the implementation of an EDI system are ...

- Choosing an inappropriate technology (one which will not interface most effectively with their trading partners)
- Unauthorized system access into the system
- Tapping into data as it is transmitted
- Loss of data integrity through human or system error
- Incomplete transactions received
- System failures

EFT (Electronic Funds Transfer)

EFT allows daily review of collection results and the making of overnight investments

but requires special controls, such as

- Segregation of duties, where only certain people can perform certain functions
- Feedback of receipt to sender
- Reports to reconcile with bank
- Reports which flag large/multiple/unscheduled EFTs
- Audit trails and logs
- Reasonableness checks/edits in programs

EDI has been popular in business, for B2B (business-to-business) commerce well before the widespread use of the Internet. EDI involves two businesses using a private communication link (or a VAN).

Other forms of electronic commerce:

Direct consumer marketing (electronic marketplaces)
Online delivery of digital products (e.g., software updates, music)
Direct market links throughout the supply chain

Point-of-sale systems usually automate source data collection, where the cashier keys in the item purchased, or the item is scanned for a UPC (bar code) or optical character recognition of actual characters/numbers on a tag. This reduces clerical errors and speeds customer check-out. Not only is cash controlled, but inventory is reduced for each sale in real time. Suppliers may be permitted access to inventory data for replenishment, although this increases inherent risk. In this case, procedures are required for:

- Authentication – user IDs and passwords should be confirmed
- Authorization – an access control list, stored internally in the operating system, would show which users had what kind of authority over which items of data
- Accountability – all changes would be recorded in a log
- Data transmission – controls (e.g., encryption) would maintain confidentiality and integrity of data transmitted

Protocols are rules and standards for the design of hardware & software. They facilitate physical connections, synchronize the transfer of data, and provide a basis for error checking.

Open systems promote compatibility, allowing hardware & software of different manufacturers to interface seamlessly. JPEG and GIF are open system standards for images. Moreover, they are scalable (efficiently compatible with small and large systems), portable, and interoperable among systems.

EFT requires common protocols so that the buyer's originating bank may remove funds from the buyer's account and transmit them electronically to the automatic clearing house (ACH) bank, and the funds may then go to the seller's account in the receiving bank. The ACH is a central bank that carries accounts for its member banks.

Because ACHs are required only to accept and process EFT formats limited to 94 characters of data, value-added banks (VABs) have arisen to accept disbursement & remittance advices in longer and more varied formats.

THE INTERNET

The Internet is an international network of independently owned smaller networks and computers that operate as a giant, linked, seamless computing network. Users can communicate inexpensively and transmit data globally. Data are not centrally stored but rather are on geographically dispersed servers.

The Internet "backbone" is the part of the network that acts as the primary path for traffic that is most often sourced from, and destined for, other networks. Companies such as IBM and Sprint maintain backbones.

Microsoft's Internet Explorer is a popular browser, although there are others, such as Netscape Navigator. A browser is software that converts text (written in Hypertext Markup Language – HTML) into Web pages, based on tags (such as "bold" or "table") embedded into the text.

Extensions of HTML, that can do more than just format Web pages, are XML (extensible markup language) and XBRL (extensible business reporting language).

An intranet is an internal network used within a company that looks like the Internet as it is accessed with browsers. It is inaccessible by the general public.

Groupware (such as Lotus Notes) is software designed to support the work of teams, possibly using a company intranet, to share information, maintain calendars for meetings, maintain company bulletin boards and personnel policies, and allow brainstorming on projects and reports.

An extranet is the linked intranets of two or more companies.

SPECIAL INTERNET ISSUES

Dependence on the Internet for e-commerce requires that the system be up & running continuously. Besides equipment failure, human error and fraud, there are malicious threats:

- ***Viruses and worms***
- Logic bombs (triggered by a predetermined event)
- Back doors (to enter a system, avoiding normal log-on)
- Trojan horses (masquerading as log-on program to capture ID's)
- Denial-of-service attacks (clogging ports to prevent legitimate users' access to a site)
- Unlike on secure or private lines, data may be captured or altered en route. And anyone in the world could potentially access your system.

FIREWALLS should be used to enforce access controls

- Network-level firewalls – low cost, low security – a screening router (hardware and/or software) to examine source & destination addresses
- Application-level firewalls – expensive, customizable – “proxy” applications can permit routine e-mail but log in, authenticate, & restrict access by particular user & task

ENCRYPTION

Private-key encryption (e.g., DES) – same key shared by sender & receiver, to encrypt & decrypt

Public-key encryption (e.g., RSA) – many senders may have public key to encrypt, but only the receiver has private key to decrypt

Digital signature – sender uses his private key to encrypt a “digest” of his message, and receiver's public key to encrypt the package of the digest & the message; receiver decrypts & compares

Digital certificate – a trusted third party (certification authority) encrypts sender's message, certifying sender's authenticity

OTHER TECHNIQUES FOR INTERNET SECURITY

- Message sequence numbering (to detect missing messages)
- Message transaction log (to recover lost messages)
- Request-response at periodic intervals to confirm other party's connection
- Call-back devices (hanging up, and calling back at authorized number/address)
- Protect against line errors with echo checks & parity checks

Chapter Ten

Multiple-Choice Questions

1. Which one of the following situations would most likely provide the **best** way to secure data integrity for a personal computer environment?
 - a. Provision of personal computers to all users.
 - b. Trained, proficient user group.
 - c. All computers linked to a local area network (LAN).
 - d. Adequate program documentation.
2. Ryan Company has an accounting information system that operates in a client/server environment. Which one of the following situations is **LEAST** likely to provide Ryan with an appropriate security environment?
 - a. Use of application passwords.
 - b. Power-on passwords for personal computers.
 - c. Installation of anti-virus programs.
 - d. Placing complete systems application controls under one individual.
3. In a computer system environment, the procedures that include the equipment configuration, program, and data files to be used as well as description of conditions that may require interruption of a program execution are known as
 - a. operating documentation.
 - b. application controls.
 - c. administrative documentation.
 - d. systems documentation.
4. Which one of the following controls is **least** likely to be closely associated with assuring the accuracy and completeness of data in computer-processed master files?
 - a. Source data controls.
 - b. File maintenance controls.
 - c. Online data entry controls.
 - d. Logical access controls.
5. Which one of the following tasks is **LEAST** likely to be undertaken in the implementation phase of an accounting software application?
 - a. Obtain and install hardware.
 - b. Enter and verify test data.
 - c. Identify inputs and outputs.
 - d. Document user procedures.
6. All of the following are examples of a decision support system (DSS) **EXCEPT** for a
 - a. financial modeling application.
 - b. transaction processing system.
 - c. database query application.
 - d. sensitivity analysis application.
7. Computers located throughout an organization's different remote facilities that are networked to fulfill information processing needs are referred to as
 - a. a local area network (LAN).
 - b. interactive processing.
 - c. centralized processing.
 - d. distributed data processing.
8. A systems analyst who is responsible for the development of an organization's information system is **LEAST** likely to perform which one of the following functions?
 - a. Analyze the present system.
 - b. Prepare computer program specifications.
 - c. Design computer applications.
 - d. Develop and code computer programs.
9. An information system (IS) project manager is currently in the process of adding a systems analyst to the IS staff. The new systems analyst will be involved with the testing of the new computerized system. At which stage of the systems development life cycle will the analyst be primarily used?
 - a. Conceptual design.
 - b. Cost-benefit analysis.
 - c. Requirements definition.
 - d. Implementation.
10. A software tool used for ad hoc, online access to items in a database would **MOST** likely be a(n)
 - a. query utility program.
 - b. application generator.
 - c. report generator.
 - d. terminal emulation software.

11. A system where several minicomputers are connected for communication and data transmission purposes, but where each computer can also process its own data, is known as a
- distributed data processing network.
 - centralized network.
 - decentralized network.
 - multidrop network.
12. Feedback, feedforward, and preventive controls are important types of control systems and procedures for an accounting information system. Which one of the following is in the correct order of feedback, feedforward, and preventive control systems?
- Cash budgeting, capital budgeting, and hiring qualified employees.
 - Inventory control, capital budgeting, and cash budgeting.
 - Cash budgeting, cost accounting variances, and separation of duties.
 - Cost accounting variances, cash budgeting, and organizational independence.
13. Which one of the following terms **best** describes a Decision Support System (DSS)?
- Management reporting system.
 - Formalized system.
 - Structured system.
 - Interactive system.
14. The process of learning how the current system functions, determining the needs of users, and developing the logical requirements of proposed system is referred to as
- systems maintenance.
 - systems analysis.
 - systems feasibility study.
 - systems design.
15. In order to prevent, detect, and correct errors and unauthorized tampering, a payroll system should have adequate controls. The **best** set of controls for a payroll system includes
- batch and hash totals, record counts of each run, proper separation of duties, passwords and user codes, and backup copies of activity and master files.
 - employee supervision, batch totals, record counts of each run, and payments by check.
 - passwords and user codes, batch totals, employee supervision, and record counts of each run.
 - sign test, limit tests, passwords and user codes, online edit checks and payments by check.
16. An accounting information system must include certain source documents in order to control purchasing and accounts payable. For a manufacturing organization, the **BEST** set of documents should include
- purchase requisitions, purchase orders, inventory reports of goods needed, and vendor invoices.
 - purchase orders, receiving reports, and inventory reports of goods needed.
 - purchase orders, receiving reports, and vendor invoices.
 - purchase requisitions, purchase orders, receiving reports, and vendor invoices.
17. The input device used in a department store where the sales clerk passes a light pen over the price tag to record the purchase is a(n)
- mark-sense reader.
 - optical scanner.
 - touch-tone device.
 - laser bar code scanner.
18. All of the following are computer input devices EXCEPT a(n)
- plotter.
 - mouse.
 - magnetic ink character recognition device.
 - light pen.
19. A critical aspect of a disaster recovery plan is to be able to regain operational capability as soon as possible. In order to accomplish this, an organization can have an arrangement with its computer hardware vendor to have a fully operational facility available that is configured to the user's specific needs. This is **BEST** known as a(n)
- uninterruptible power system.
 - parallel system.
 - cold site.
 - hot site.
20. Which one of the following statements about an accounting information system (AIS) is **incorrect**?
- AIS supports day-to-day operations by collecting and sorting data about an organization's transactions.
 - The information produced by AIS is made available to all levels of management for use in planning and controlling an organization's activities.
 - AIS is best suited to solve problems where there is great uncertainty and ill-defined reporting requirements.
 - AIS is often referred to as a transaction processing system.

21. Which one of the following features is **least likely** to apply to the transaction processing cycle of an accounting information system?
- Data records are chiefly historical in nature.
 - Most of the sources of data are an organization's recurring transactions.
 - Data are usually financial in nature.
 - Data records are the basis of predictive systems.
22. Which one of the following is NOT considered a typical risk associated with outsourcing (the practice of hiring an outside company to handle all or part of the data processing)?
- Inflexibility.
 - Loss of control.
 - Less availability of expertise.
 - Locked-in relationship with a vendor.
23. Which one of the following statements about an executive information system (EIS) is **incorrect**?
The EIS
- is likely to be one of the most widely used and the largest of the information subsystems in a business organization.
 - helps executives monitor business conditions in general and assists in strategic planning to control and operate the company.
 - is designed to accept data from many different sources; combine, integrate, and summarize the data; and to display this data in a format that is easy to understand and use.
 - provides information that is highly aggregated; however, the details supporting the aggregated data are accessible.
24. Which one of the following BEST reflects the basic elements of a data flow diagram?
- Data sources, data flows, computer configurations, flowchart, and data storage.
 - Data source, data destination, data flows, transformation processes, and data storage.
 - Data flows, data storage, and program flowchart.
 - Data flows, program flowchart, and data destination.
25. Which one of the following **best** depicts the path of data as it moves through an information system?
- Program flowcharts.
 - Computer system flowcharts.
 - Decision table.
 - HIPO chart.
26. All of the following are included in the systems implementation process **except**
- training.
 - documentation.
 - systems design.
 - testing.
27. The analysis tool for the systems analyst and steering committee to use in selecting the **best** systems alternative is
- cost benefit analysis.
 - systems design.
 - decision tree analysis.
 - user selection.
28. In distributed data processing, a ring network
- has all computers linked to a host computer and each linked computer routes all data through the host computer.
 - links all communication channels to form a loop.
 - attaches all channel messages along one common line with communication to the appropriate location via direct access.
 - organizes itself along hierarchical lines of communication usually to a central host computer.
29. The indexed-sequential-access method (ISAM) is an approach to file organization
- in which each data record has a pointer filed containing the address of the next record in the list.
 - where an index of record pointers of some of the file attributes are maintained in a list.
 - utilizes an algorithm to convert a record key into a storage address to assist with later retrieval.
 - where records are stored sequentially in a direct access file and organized by a primary key stored in an index record.
30. Block codes
- are generally used to identify missing items from a set of documents or records.
 - allow a user to number items sequentially.
 - allow a user to assign meaning to particular segments of a coding scheme.
 - are randomly calculated groups of numbers used as a control check.

31. The main components of the central processing unit of a computer are
- semiconductors, on-line devices, and memory.
 - arithmetic-logic unit, control unit, and primary memory.
 - random access memory, read only memory, and auxiliary storage.
 - primary storage, input-output devices, and arithmetic-logic unit.
32. Access time in relation to computer processing is the amount of time it takes to
- transmit data from a remote terminal to a central computer.
 - complete a transaction from initial input to output.
 - perform a computer instruction.
 - retrieve data from memory.
33. Banks are required to process many transactions from paper documents (e.g. checks, deposit slips) during the course of an average business day. This requires a reliable, yet economical form of input. The MOST common source of automation device used by banks is
- a disk pack.
 - magnetic tape.
 - bar coding.
 - magnetic ink character recognition.
34. A local area network (LAN) is BEST described as a
- computer system that connects computers of all sizes, workstations, terminals, and other devices within a limited proximity.
 - system to allow computer users to meet and share ideas and information.
 - electronic library containing millions of items of data that can be reviewed, retrieved, and analyzed.
 - method to offer specialized software, hardware and data handling techniques that improve effectiveness and reduce costs.
35. One advantage of a database management system is
- that each organizational unit takes responsibility and control for its own data.
 - the cost of the data processing department decreases as users are not responsible for establishing their own data handling techniques.
 - a decreased vulnerability as the database management system has numerous security controls to prevent disasters.
 - the independence of the data from the application programs which allows the programs to be developed for the user's specific need without having to be concerned with data capture problems.
36. A flat file structure is used in database management systems when
- a complex network structure is employed.
 - a network based structure is used and a complex database schema is developed.
 - a simple network structure is employed.
 - a relational database model is selected for use.
37. In the organization of the information systems function, the MOST important separation of duties is
- not allowing the data librarian to assist in data processing operations.
 - assuring that those responsible for programming the system do not have access to data processing operations.
 - having a separate information officer at the top level of the organization outside of the accounting function.
 - using different programming personnel to maintain utility programs from those who maintain the application programs.
38. Data input validation routines include
- terminal logs.
 - passwords.
 - hash totals.
 - backup controls.

39. Information systems steering committees
- should consist of systems specialist and end users that plan and direct projects throughout the systems life cycle.
 - should consist of systems management, the controller, and other management personnel and should establish policies with regard to an organization's information system.
 - are found in organizations that have had a history of information system problems with the focus of the committee being the overseeing of information systems development.
 - utilize a top down approach to the solution of the information system problems.
40. In designing systems of internal control, which of the following types of controls are the **best** to include in the design in order to be fully effective?
- Preventive, detective, and corrective controls.
 - Feedforward, batch, and on-line controls.
 - Management, personnel, and administrative controls.
 - Edit, input verification, and output controls.
41. Which of the following **best** describe the inter-related components of a system of internal control?
- Organizational structure, management philosophy, and planning.
 - Control environment, risk assessment, control activities, information and communication systems, and monitoring.
 - Risk assessment, backup facilities, responsibility accounting, and natural laws.
 - Legal environment of the firm, management philosophy, and organizational structure.
42. In the computer program development process, a problem will **most** likely result when
- programmers take a longer amount of time to perform programming tasks than expected.
 - written specifications from the user are used to develop detail program code.
 - programmers use specialized application tools to simulate the system being programmed.
 - user specifications are inadvertently misunderstood.
43. The possibility of erasing a large amount of information stored on magnetic tape most likely would be reduced by the use of
- File protection rings.
 - Check digits.
 - Completeness tests.
 - Conversion verification.
44. Which of the following most likely represents a weakness in the internal control structure of an EDP system?
- The systems analyst reviews output and controls the distribution of output from the EDP department.
 - The accounts payable clerk prepares data for computer processing and enters the data into the computer.
 - The systems programmer designs the operating and control functions of programs and participates in testing operating systems.
 - The control clerk establishes control over data received by the EDP department and reconciles control totals after processing.
45. Which of the following computer documentation would an auditor most likely utilize in obtaining an understanding of the internal control structure?
- Systems flowcharts.
 - Record counts.
 - Program listings.
 - Record layouts.
46. The real-time feature normally would be least useful when applied to accounting for a firm's
- Bank account balances.
 - Property and depreciation.
 - Customer accounts receivable.
 - Merchandise inventory.
47. A fundamental programming technique which allows computers to be utilized effectively in solving repetitive problems is
- Dynamic reallocation.
 - Indexed sequential access.
 - Graceful degradation.
 - Looping.

48. Daylight Corporation's organization chart provides for a controller and an EDP manager, both of whom report to the financial vice-president. Internal control would not be strengthened by
- Assigning the programming and operating of the computer to an independent control group which reports to the controller.
 - Providing for maintenance of input data controls by an independent control group which reports to the controller.
 - Rotating periodically among machine operators the assignments of individual application runs.
 - Providing for review and distribution of computer output by an independent control group which reports to the controller.
49. On magnetic discs, more than one file may be stored on a single physical file, while in multiprogramming computer operations, several programs may be in core storage at one time. In both cases, it is important to prevent the intermixing or overlapping of data. This is accomplished by a technique known as
- Boundary protection.
 - File integrity.
 - Paging.
 - Interleaving.
50. A technique for controlling identification numbers (part number, man number, etc.) is
- Self-checking digits.
 - Echo checks.
 - Parity control.
 - File protection.
51. Which of the following is a characteristic of an integrated system for data processing?
- An integrated system is a real-time system where files for different functions with similar information are separated.
 - A single input record describing a transaction initiates the updating of all files associated with the transaction.
 - Parallel operations strengthen internal control over the computer processing function.
 - Files are maintained according to organizational functions such as purchasing, accounts payable, sales, etc.
52. An electronic data processing technique, which collects data into groups to permit convenient and efficient processing, is known as
- Document-count processing.
 - Multi-programming.
 - Batch processing.
 - Generalized-audit processing.
53. Which of the following employees in a company's electronic data processing department should be responsible for designing new or improved data processing procedures?
- Flowchart editor.
 - Programmer.
 - Systems analyst.
 - Control-group supervisor.
54. Totals of amounts in computer-record data fields which are **not** usually added but are used only for data processing control purposes are called
- Record totals.
 - Hash totals.
 - Processing data totals.
 - Field totals.
55. Which of the following is a computer test made to ascertain whether a given characteristic belongs to the group?
- Parity check.
 - Validity check.
 - Echo check.
 - Limit check.
56. Errors in data processed in a batch computer system may **not** be detected immediately because
- Transaction trails in a batch system are available only for a limited period of time.
 - There are time delays in processing transactions in a batch system.
 - Errors in some transactions cause rejection of other transactions in the batch.
 - Random errors are more likely in a batch system than in an on-line system.

57. When EDP programs or files can be accessed from terminals, users should be required to enter a(an)

- a. Parity check.
- b. Personal identification code.
- c. Self-diagnosis test.
- d. Echo check.

58. An online sales order processing system most likely would have an advantage over a batch sales order processing system by

- a. Detecting errors in the data entry process more easily by the use of edit programs.
- b. Enabling shipment of customer orders to be initiated as soon as the orders are received.
- c. Recording more secure backup copies of the data base on magnetic tape files.
- d. Maintaining more accurate records of customer accounts and finished goods inventories.

59. If a control total were computed on each of the following data items, which would best be identified as a hash total for a payroll EDP application?

- a. Total debits and total credits.
- b. Net pay.
- c. Department numbers.
- d. Hours worked.

60. Which of the following statements most likely represents a disadvantage for an entity that keeps microcomputer-prepared data files rather than manually prepared files?

- a. Attention is focused on the accuracy of the programming process rather than errors in individual transactions.
- b. It is usually easier for unauthorized persons to access and alter the files.
- c. Random error associated with processing similar transactions in different ways is usually greater.
- d. It is usually more difficult to compare recorded accountability with physical count of assets.

61. Misstatements in a batch computer system caused by incorrect programs or data may not be detected immediately because

- a. Errors in some transactions may cause rejection of other transactions in the batch.
- b. The identification of errors in input data typically is not part of the program.
- c. There are time delays in processing transactions in a batch system.
- d. The processing of transactions in a batch system is not uniform.

62. Which of the following controls is a processing control designed to ensure the reliability and accuracy of data processing?

	<u>Limit test</u>	<u>Validity check test</u>
a.	Yes	Yes
b.	No	No
c.	No	Yes
d.	Yes	No

63. Able Co. uses an online sales order processing system to process its sales transactions. Able's sales data are electronically sorted and subjected to edit checks. A direct output of the edit checks most likely would be a

- a. Report of all missing sales invoices.
- b. File of all rejected sales transactions.
- c. Printout of all user code numbers and passwords.
- d. List of all voided shipping documents.

64. Which of the following is an example of a validity check?

- a. The computer ensures that a numerical amount in a record does **not** exceed some predetermined amount.
- b. As the computer corrects errors and data are successfully resubmitted to the system, the causes of the errors are printed out.
- c. The computer flags any transmission for which the control field value did **not** match that of an existing file record.
- d. After data for a transaction are entered, the computer sends certain data back to the terminal for comparison with data originally sent.

65. Which of the following control procedures most likely could prevent EDP personnel from modifying programs to bypass programmed controls?

- Periodic management review of computer utilization reports and systems documentation.
- Segregation of duties within EDP for computer programming and computer operations.
- Participation of user department personnel in designing and approving new systems.
- Physical security of EDP facilities in limiting access to EDP equipment.

66. An entity has the following invoices in a batch:

<u>Invoice #</u>	<u>Product</u>	<u>Quantity</u>	<u>Unit Price</u>
201	F10	150	\$ 5.00
202	G15	200	\$10.00
203	H20	250	\$25.00
204	K35	300	\$30.00

Which of the following numbers represents the record count?

- 1
- 4
- 810
- 900

67. An entity has the following invoices in a batch:

<u>Invoice #</u>	<u>Product</u>	<u>Quantity</u>	<u>Unit Price</u>
201	F10	150	\$ 5.00
202	G15	200	\$10.00
203	H20	250	\$25.00
204	K35	300	\$30.00

Which of the following most likely represents a hash total?

- FGHK80
- 4
- 204
- 810

68. Jones, an auditor for Farmington Co., noted that Acme employees were using computers connected to Acme's network by wireless technology. On Jones' next visit to Acme, Jones brought one of Farmington's laptop computers with a wireless network card. When Jones started the laptop to begin work, Jones noticed that the laptop could view several computers on Acme's network and Jones had access to Acme's network files. Which of the following statements is the most likely explanation?

- Acme's router was improperly configured.
- Farmington's computer had the same administrator password as the server.
- Jones had been given root account access on Acme's computer.
- Acme was not using security on the network.

69. In an accounting information system, which of the following types of computer files most likely would be a master file?

- Inventory subsidiary.
- Cash disbursements.
- Cash receipts.
- Payroll transactions

70. Which of the following forecasting methods relies mostly on judgment?

- Time series models.
- Econometric models.
- Delphi.
- Regression.

71. Which of the following risks can be minimized by requiring all employees accessing the information systems to use passwords?

- Collusion.
- Data entry errors.
- Failure of server duplicating function.
- Firewall vulnerability.

72. What is the primary advantage of using an *application firewall* rather than a network firewall?

- It is less expensive.
- It offers easier access to applications.
- It provides additional user authentication.
- It is easier to install.

Chapter Ten

Answers to Multiple Choice Questions

1. (c) Answer (c) is correct as the best way to secure data integrity among the five methods listed. Linking all computers to a LAN would improve security, allowing the control over who has access to which programs and files, and allowing for the automatic back-up of all data daily. Answer (a) is not correct because the provision of personal computers to all users would reduce data integrity by increasing the number of opportunities to introduce error or fraud into the system. Answer (b) is not correct because while a trained, proficient user group may reduce the accidental destruction of data, it would not guarantee that the users would always do the right thing. They might be overly confident and take short cuts or they might use their knowledge to commit fraud. Answer (d) is not correct because the use of adequate documentation does not guarantee that everyone will read it nor that they will avoid the commission of fraud.

2. (d) Answer (d) is correct because if one individual has complete authority over systems applications controls, he or she could too easily bypass those controls. Answer (a) is not correct because application passwords are helpful in prohibiting access to software to only those authorized to use it. Answer (b) is not correct because power-on passwords are helpful in prohibiting access to the system to only those authorized to have access. Answer (c) is not correct because anti-virus programs are helpful in scanning disks and files introduced into the system for destructive virus software.

3. (a) Answer (a) is correct. Operating documentation is prepared for the computer operator so that he or she can run the program. It includes the equipment configuration, instructions for entering data on the console, and descriptions of conditions which cause the program to halt. Answer (b) is incorrect because they are controls built into a specific computer application. Answer (c) is not correct because administrative documentation includes overall standards, policies, and procedures for the computer facility. Answer (d) is not correct because systems documentation is a complete description of all aspects of each application, including flowcharts and program listings.

4. (d) Answer (d) is correct because logical access relates to the ability to use computer equipment to access data. Accordingly, while helpful, these controls would not be as closely associated with assuring accuracy and completeness of data as the other choices. Answer (a) is not correct because source data controls would be helpful in assuring that data entered from source information are correct and complete. Answer (b) is not correct because these controls over the addition, deletion, and changing of records in files would be useful in assuring their accuracy and completeness. Answer (c) is not correct because controls over the entry of data during on-line processing would help assure the accuracy and completeness of files.

5. (c) Answer (c) is correct because the identification of inputs and outputs must occur well before implementation. Inputs and outputs of the current system are identified during systems analysis, while inputs and outputs of the new system are developed during the design phase. Answer (a) is not correct because hardware installation often takes place during the implementation phase of an application. Answer (b) is not correct because testing the system is usually part of the implementation phase. Answer (d) is not correct because completing the documentation usually takes place during the implementation phase.

6. (b) A transaction processing system is not a DSS. A transaction processing system processes (usually accounting) transactions at the basic level of an organization, providing outputs usually on scheduled reports. A DSS, on the other hand, provides support for unstructured or semi-structured decisions and suggests possible choices, accessing a database or a decision-making model. Answer (a) is not correct because a financial modeling application is an example of a DSS. These systems provide support for unstructured or semi-structured decisions and suggest possible choices, accessing a database or a decision making model. Answer (c) is not correct because a database query application is an example of a DSS. These systems provide support for unstructured or semi-structured decisions and suggest possible choices, accessing a database or a decision-making model. Answer (d) is not correct because a sensitivity analysis application is an example of a DSS. Sensitivity analysis involves making changes to some parameters or inputs and observing the impact of such changes on the result. DSSs, likewise, provide support for unstructured or semi-structured decisions and suggest possible choices, accessing a database or a decision-making model.

7. (d) Answer (d) is correct because distributed data processing does distribute computers to a company's remote locations and link them together. Answer (a) is not correct because a LAN links equipment within a limited geographical area such as one building. Answer (b) is not correct because interactive processing simply refers to an operating system which permits the user and the computer to interact, with the system responding within a reasonable time to the user. Answer (c) is not correct because centralized processing refers to the consolidation of all equipment and personnel within the same geographical area.

8. (d) Answer (d) is correct because developing and coding computer programs is the responsibility of a programmer. Answer (a) is not correct. Analyzing the present system is, by definition, what a systems analyst does. Answer (b) is not correct because preparing computer program specifications would be done by the systems analyst during the design phase. Answer (c) is not correct because designing computer applications would be done by the systems analyst when he or she does systems design.

9. (d) is the correct answer. The implementation stage of the systems development life cycle includes training users in the new system and testing the system. Answer (a) is not correct because conceptual design includes activities such as evaluating design characteristics and developing design specifications. Answer (b) is not correct because cost-benefit analysis is an activity that should be done at the end of each major stage of the systems development life cycle, before advancing to the next stage. Answer (c) is not correct because the requirements definition is done early in the systems development life cycle, during systems analysis.

10. (a) is the correct answer. A utility program is a pre-written program to perform, primarily, housekeeping functions. One such function could be to query a database, or to request specific information from it. Answer (b) is not correct because an application generator is software which facilitates the writing of programs. Answer (c) is not correct because a report generator is software which lets the user specify the data elements to be printed. Answer (d) is not correct because terminal emulation software makes a computer behave like a terminal so that it can access another (usually much larger) computer.

11. (a) is the correct answer. Distributed data processing distributes computers at remote locations and links them. Each computer can do its own processing, but data can be shared because of common standards. Answer (b) is not correct because a centralized network performs all processing centrally, with only dumb terminals at the remote locations. Answer (c) is not correct because a decentralized network uses independent processors at each location, with little concern about communication and transmission among them. Answer (d) is not correct because a multidrop network is normally a centralized system using dumb terminals rather than minicomputers, and having most terminals linked together with only one (or a few) linked directly to the main computer.

12. (d) is the correct answer. Cost accounting variances are feedback controls, since they provide feedback, after the fact, of the degree of manufacturing efficiency. Cash budgeting is a feedforward control, since it can warn in advance of any looming problems. Organizational independence, properly enforced, is a preventive control, since it prevents unauthorized people from performing an incompatible function.

13. (d) is the correct answer. A DSS is interactive. The user's active involvement is essential, providing inputs and reacting to outputs as the DSS suggests decision choices. Answer (a) is not correct because a management reporting system may only provide reports to management, rather than accepting inputs from the manager and providing decision choices. Answer (b) is not correct because a formalized system refers to the documented, official, methods of sending, receiving, and processing information in an organization. Answer (c) is not correct because a structured system is one in which solutions may be automated because of readily defined rules. DSSs are used in unstructured or semi-structured environments.

14. (b) is the correct answer. Systems analysis is that stage of the systems development life cycle which includes the initial investigation of the current system, the systems survey, the feasibility study, and the determination of information needs and system requirements. Answer (a) is not correct because systems maintenance is that ongoing stage of the systems development life cycle which involves doing necessary modifications and improving the system. Answer (c) is not correct because the systems feasibility study is a task that occurs during the systems analysis stage of the systems development life cycle. Answer (d) is not correct because systems design is that stage of the systems development life cycle which includes developing design specifications, and designing output, inputs, and databases.

15. (a) is the correct answer. This is a good combination of controls. Batch and hash totals and record counts will detect input errors or skipped records. Proper separation of duties will prevent unauthorized tampering and could help detect errors. Passwords and user codes can prevent unauthorized tampering. And backup copies can help correct errors when files are damaged.

16. (d) is the correct answer. This is a good combination. The purchase requisition is evidence that some user needs the goods. The purchase order specifies the price and quantity authorized by the purchasing department. The receiving report is evidence of the quantity actually received. The vendor invoice is evidence of the vendor's request to be paid for the specified quantity (which should be matched with the receiving report and purchase order) and price (which should be matched with the purchase order).

17. (b) is the correct answer. An optical scanner is used by a clerk with a light pen to read actual characters or numbers which have been typewritten, computer-printed, or hand-written. Choice (a) is incorrect. A mark-sense reader reads optical marks and is used for grading multiple choice tests. Choice (c) is incorrect. A touch-tone device is used for inputting data by using a touch-tone telephone. Choice (d) is incorrect. A laser bar code scanner reads bar codes, such as the universal produce code (UPC) which is found on grocery products and which is read with scanners that emit an intense light and are built into the counter or hand-held.

18. (a) is the correct answer. A plotter is an output device. It is a special type of printer used for producing graphical output. Generally, a plotter has a moving writing arm which draws across the paper. An architect would be interested in such a device. Choice (b) is incorrect. A mouse is a small input device which sends signals to the computer as it moves across a surface (a desk) and can be used to point to objects on the computer screen and activate them by clicking a button on the mouse. Choice (c) is incorrect. Magnetic ink character recognition (MICR) devices send input to the computer as they read characters and numbers printed with magnetic ink, most frequently from the bottom of bank checks. Choice (d) is incorrect. A light pen sends data to the computer using photoelectric circuitry through the computer screen.

19. (d) is the correct answer. A hot site is a fully operational facility that is available on short notice and configured to the specific needs of the disaster-stricken user. Choice (a) is incorrect. An uninterruptible power system involves a power supply operating as a buffer between the power from the electric utility and the user, smoothing fluctuations in power (surges or dips) and providing some back-up power in the event of a total power loss. Choice (b) is incorrect. A parallel system would be another company which uses the same computer system. Choice (c) is incorrect. A cold site is a location which has everything necessary to function as a fully operational facility in the event of a disaster except for the computer equipment and software, which would have to be delivered in the event of an emergency.

20. (c) is the correct answer. An AIS is generally designed to process routine transactions on a regular basis. Its decisions are very structured. Thus, unlike a Decision Support System, an AIS is not well-suited to solve problems where there is great uncertainty or ill-defined reporting requirements. Choice (a) is incorrect. An AIS is designed for day-to-day processing of accounting transactions, at the operational level of a company. Transactions are often collected and sorted for batch processing. Choice (b) is incorrect. Unlike other information systems, which might be available only for top management, accounting information is generally used by all levels of management for their functions of planning, controlling, and evaluating performance. Choice (d) is incorrect. Although there are other types of information systems, such as operational support systems, decision support systems, and executive information systems, AISs are considered transaction processing systems because they process accounting transactions at the basic level of the organization.

21. (d) is the correct answer. Processing transactions is the basic level of an accounting information system. The transactions could be for accounts receivable, accounts payable, payroll, etc. These records are designed for controlling the basic cycles of the company, and they are not designed for their predictive ability. Choice (a) is incorrect. The data records for transaction processing cycles, such as accounts receivable, accounts payable, or payroll, are designed for storage and processing of historical information. Choice (b) is incorrect. While there are some nonrecurring transactions, most of the transactions in these cycles are recurring ones, such as sales, purchases, and payroll. Choice (c) is incorrect. Accounting transactions do turn economic data about the company and its external relationships into financial information.

22. (c) is the correct answer. With outsourcing, the hope is that by using a company which specializes in data processing, there would be more expertise available than by doing the data processing in-house where it is auxiliary to our main business. Choice (a) is incorrect. The outside company may be inflexible in that it may want us to use its payroll systems, for example, rather than one designed specifically for us. Also, for another example, it may be closed for certain holidays when we need service. Choice (b) is incorrect. There is a potential loss of control when the data processing employees do not work for us, but work instead for the outside company. Choice (d) is incorrect. A locked-in relationship is a concern because the outside company may be processing our customer records and we cannot take the chance of losing any processing days by switching to another vendor.

23. (a) is the correct answer. An EIS is not designed to be widely used. It is tailored to the needs of a specific executive. For example, an EIS for the treasurer, will include measuring tools needed to control that specific function, such as interest rates and cash balances. Choice (b) is incorrect. The executive information systems of the various executives will have some elements in common for all the executives about the business conditions and some specific elements to help each executive in controlling functional areas. Choice (c) is incorrect. An EIS includes traditional internal company data and also nontraditional data from external sources (such as stock quotes and breaking news) integrated in a way that is not so complex that it would be difficult to use. Choice (d) is incorrect. Executives, with their broad scope of responsibility, must see information in aggregated form; however, if they are interested in probing, they should have access to the supporting detail.

24. (b) is the correct answer. Data flow diagrams contain rectangles representing entities, circles (or "bubbles") representing processes, parallel lines representing data storage, and arrows representing the data flows among the previous three shapes. Entities, processes, and storage may at different times be sources or destinations of data. Choice (a) is incorrect. Computer configurations are not shown on a data flow diagram, which shows the flow of data independent of specific media used. And a flowchart is a different representation which shows files and processes. Choice (c) is incorrect. A program flowchart is a different representation which shows the internal logic of a program. Choice (d) is incorrect. A program flowchart is a different representation which shows the internal logic of a program.

25. (b) is the correct answer. Computer system flowcharts use specific shapes to represent specific physical media used for files and processes. It shows input documents, output reports, tape files, disk files, terminal input, computer processes, and manual processes. Arrows connecting those shapes depict the path of data through the information system. Choice (a) is incorrect. Program flowcharts show only the internal logic of a particular program. They do not broadly show data moving through the information system. Choice (c) is incorrect. Decision tables show in tabular form the internal logic of a particular program or the actions to be taken given specific conditions. They do not broadly show data moving through the information system. Choice (d) is incorrect. HIPO is an acronym for hierarchy + input process output. These charts show functions as blocks in a hierarchical chart, with lower-level blocks as subfunctions of higher level ones. They do not show the path of data moving through an information system.

26. (c) is the correct answer. Systems design must occur much earlier in the systems development process than during implementation. One would hope that the system is designed well before it is implemented. Choice (a) is incorrect. Training and educating system users does occur during systems implementation. Choice (b) is incorrect. Although some of it might occur earlier, documentation is completed during systems implementation. Choice (d) is incorrect. Testing of the new system would occur during systems implementation.

27. (a) is the correct answer. Cost benefit analysis should be used for selecting the best systems alternative. The costs of each alternative should be evaluated against the benefits. Choice (b) is incorrect. Systems design is a phase in which the new system is broadly designed by matching user needs to the application. Selection of alternatives is not involved in this phase. Choice (c) is incorrect. Decision tree analysis involves laying out the various paths of possibilities and attaching probabilities to each branch. Expected values are computed. It is not well suited for selecting the best systems alternative. Choice (d) is incorrect. Users' preferences are to be considered, but the users may not be in the best position to weigh all of the costs of each alternative against benefits.

28. (b) is the correct answer. A ring network is indeed wired like a ring, or a loop, such that each link passes communication through its neighbor. And a distributed data processing distributes the hardware in a manner where it may be tailored to the needs of that location's processing. All data does not need to go through the host [choice (a)] in a ring, although it would in a star network. There is not direct access [choice (c)] in a ring, but rather communication must pass through other links; it is a bus network which uses one common line with direct access. A ring is not a hierarchical [choice (d)] configuration, but rather a loop; it is a tree network which is hierarchical.

29. (d) is the correct answer. ISAM files are stored sequentially by primary key on a direct access device, such as a disk. In addition, there is a separate index or directory in which the system may look up a key and find that record's disk address. Thus records may be processed sequentially, but may also be accessed directly for queries. ISAM records do not have pointer fields embedded in them [choice (a)] like a linked list; rather, there is a separate index for such pointers. It is not some of the attributes [choice (b)] for which the index is maintained. ISAM does not utilize an algorithm [choice (c)] the way that randomization does.

30. (c) is the correct answer. Block coding does reserve a block of numbers or letters for a particular segment. To identify missing items ([choice (a)], sequential coding would be used. To number items sequentially [choice (b)], sequential coding would be used. Block codes are not randomly calculated and not used as a control check [choice (d)].

31. (b) is the correct answer. The ALU, the control unit, and primary storage are the three main components of the CPU. Other components are peripheral units. On-line devices [choice (a)] are not in the CPU. Auxiliary storage [choice (c)] is not in the CPU. Input-output devices [choice (d)] are not in the CPU.

32. (d) is the correct answer. The amount of time required to retrieve or access data from memory is access time. The time to transmit data from a remote terminal [choice (a)] applies only in networks and refers to transmittal rather than access. The time to complete a transaction [choice (b)] may involve multiple accesses and waiting; this is actually throughput time. The performance of a computer instruction [choice (c)] is very fast and may involve no accessing at all.

33. (d) is the correct answer. MICR is indeed the method used by banks, with necessary data (such as the bank identifier and the customer's account number) preprinted on the check with magnetic ink. A disk pack [choice (a)] is a storage unit, not a source automation device. Magnetic tape [choice (b)] is a storage unit, not a source automation device. Bar coding [choice (c)] is used on grocery products and many other items, but not on bank checks.

34. (a) is the correct answer. A LAN is within a limited proximity (local) and connects computers of all sizes. A LAN does not allow users to meet [choice (b)]. A LAN may or may not provide access to an electronic library [choice (c)]. A LAN may or may not improve effectiveness and reduce costs [choice (d)] and may not involve specialized hardware.

35. (d) is the correct answer. Data independence is a feature of a DBMS. Applications do not "own" data. Rather, data records are common, maintained by the DBMS which allows access to authorized users. New applications may be developed without concern about the data's physical structure. In a DBMS, users do not "own" their own data [choice (a)]. In a DBMS, users are not responsible for their own data [choice (b)] because applications do not typically "own" proprietary data and the DP department is concerned with data storage. A DBMS should have controls built in [choice (c)] because it is in fact more vulnerable than a file-oriented system as different users are all accessing common data.

36. (d) is the correct answer. A relational database model does use flat files, or tables, which may be related to one another by means of common fields, columns or attributes. A complex network structure [choice (a)] links records together in an intricate variety of ways; they are not neatly stored in flat files. A network with a complex schema [choice (b)] links records together in an intricate variety of ways; they are not neatly stored in flat files. A simple network [choice (c)] links records together in an intricate variety of ways; they are not neatly stored in flat files.

37. (b) is the correct answer. Separating the programming function from the operating function is considered the most critical. Programmers have too much knowledge of the controls, or lack of controls, built into the program. Thus, in operating, the programmers could circumvent controls. The data librarian [choice (a)] may assist in operations if necessary but should not have access to equipment. It is permissible to have the top information officer

[choice (c)] reporting to an accounting officer. It is permissible and common to have the same programmers maintaining both utility programs [choice (d)] and application programs.

38. (c) is the correct answer. Hash totals are totals in a batch of input transactions which by themselves are meaningless, such as the total of the employee numbers, or the total of the vendor numbers. But such a total may be checked later in the processing to verify that no errors were made in their entry, thus providing input validation. Terminal logs [choice (a)] may show which programs were accessed, but provide no input validation. Passwords [choice (b)] assure that only authorized users gain access, but do not validate input. Backup controls [choice (d)] assure that copies of files are maintained, but do not validate input.

39. (b) is the correct answer. Steering committees set priorities for the information systems function, choosing which projects are most important for the company. Thus they should include upper management from the information systems department, as well as management from most other functional areas. It is usually management rather than end users [choice (a)] who serve on the steering committee, and the committee, with its broad representation, does not get involved to the level of directing particular projects through their life cycles. Steering committees [choice (c)] help assure that the information systems function performs according to the company's priorities; thus, they would more likely be found in organizations without system problems, but should exist in all computerized companies. Top-down [choice (d)], which focuses first on the information needs of top management, and bottom-up, which focuses first on the users and operators, are approaches to developing applications and are independent of the existence of a steering committee.

40. (a) is the correct answer. Preventive controls (designed to prevent errors or fraud), detective controls (designed to detect errors or fraud), and corrective controls (designed to correct errors or fraud) comprise a collectively exhaustive way to classify controls. Feedforward controls (b) may be used with batch or on-line computer systems; this answer does not comprise all controls. Management, personnel, and administrative controls (c) fails to include many computer and operational controls. Edit, input verification, and output controls (d) relate only to computer input and output.

41. (b) is the correct answer. These five components have been described as key. The control environment sets the overall tone, risk assessment identifies and analyzes risk, control activities ensure the following of management policies, information and communication systems provide information necessary for responsibilities to be met, and monitoring assesses the control structure. Planning (a) is not a component, while the other two are part of the control environment. Backup facilities, responsibility accounting, and natural laws (c) are not components. The factors in choice (d) are part of the control environment.

42. (d) is the correct answer. It is almost certain that misunderstanding user specifications will result in serious problems in program development. Programmers taking a longer time than expected (a) might cause budget problems but would not damage the quality of the programs. Written user specifications (b) would in fact be quite helpful in developing code. Specialized tools (c) are becoming a popular method for expediting quality programming.

43. (a) A file protection ring is a removable plastic or metal ring, the presence or absence of which prevents an employee from writing on a magnetic tape and thereby prevents the accidental destruction of a magnetic tape file. Answers (b), (c) and (d) are other examples of input and processing controls.

44. (a) A data control group should review output and control the distribution of output from the EDP department. The systems analyst designs and evaluates systems and prepares program specifications for programmers. These two functions should be separated. Answer (b) may be acceptable, especially in an on-line system. Answers (c) and (d) describe appropriate functions of a programmer and a control clerk.

45. (a) A systems flowchart is a pictorial representation of the processing steps in moving an item through processing. The question deals with understanding the internal control structure. Therefore, a flowchart would aid the auditor in understanding the flow of the system.

46. (b) The real time feature of a computer is best used on accounting data that requires frequent inquiries. Property depreciation would have the least reason for the real time feature.

47. (d) A loop is a sequence of instructions that can be executed repetitively. Each repetition is called a cycle and cycling continues until a specified criteria is satisfied.
48. (a) The assignment of programmers and the operation of a computer are the prime responsibilities of an EDP manager. An independent control group should function between the user department and the EDP department. Items (b), (c) and (d) are good examples of internal control within an EDP system.
49. (a) Boundary protection is a method of protecting access to unauthorized areas of a device such as a magnetic disc or drum. Sections of core storage are also partitioned so that more than one program can be operated at the same time. This method prevents overlapping of operations of one partition to another.
50. (a) One method for controlling identification numbers is to include an appended check digit as part of the number which is a result of some mathematical process that is applied to each digit in the number. The additional digit created is the result of this mathematical process.
51. (b) An integrated data processing system is a system designed to minimize duplicate operations and duplicate records. The most important characteristic would be a single input record describing a given transaction which initiates the updating of all files associated with the transaction.
52. (c) Batch processing is a technique in which items to be processed are collected into groups (batches) to permit convenient and efficient processing.
53. (c) A systems analyst has the primary responsibility for the design of new and improved data processing procedures.
54. (b) Hash totals are summations for checking purposes of one or more corresponding fields of a file which would ordinarily not be summed," (i.e., ID#).
55. (b) A validity check is a hardware check that determines whether or not a particular character is a legitimate member of the permissible character set (alphanumeric, numeric, etc.).
56. (b) Batch processing is a technique in which items to be processed are collected into groups to permit convenient and efficient processing. The records of all transactions affecting a particular master file are accumulated over a period of time, then arranged in a sequence and processed against the master file. Because transactions are accumulated over a period of time, there will be time delays in processing transactions and errors may not be detected immediately.
57. (b) Access controls deal with ensuring that only authorized people can use EDP programs or files. An example is an on-line access password system, such as a personal identification code. Answer (a) is applied by the computer to assure that bits are not lost during the process. Answer (d) is a check upon the accuracy of a data transfer operation.
58. (b) On-line processing occurs when transactions can be input into computer processing from the point of origin without first being sorted. Batch processing is a technique in which the records of all transactions affecting a particular master file are accumulated over a period of time, then arranged in a sequence and processed against the master file as a group. An on-line sales order processing system could be used to initiate sales transactions as soon as orders are received, whereas batch processing would delay initiating the sales transaction until a group of sales orders was processed.
59. (c) A hash total is a sum of numbers in a specified field of a record, or of a batch of records, used for checking and control purposes. A hash total is distinguishable from other control totals in that it is not meaningful for the accounting records and is not usually added. Answer (c) best meets the definition for a hash total.
60. (b) In manual accounting systems, records are kept and files are prepared by individuals who are responsible and accountable for security of and access to those files and records. In order to alter the records, an unauthorized individual would have to manually access the files and manually make changes. Accessing and altering files in a

microcomputer-based accounting system is usually easier. If an unauthorized individual successfully enters the computer system, he or she may be able to access and alter many records. The microcomputer-prepared data files could then be changed electronically, leaving no indication that an unauthorized individual entered the system and changed data. Answer (a) is incorrect because, although it may be true that attention is focused on programming rather than individual transactions, this is not necessarily a disadvantage of a microcomputer-based system. Answer (c) is incorrect because random error is usually less in a microcomputer-based system since transactions are processed uniformly. Answer (d) is incorrect because it is not more difficult to compare records with physical counts if an entity has microcomputer-prepared records.

61. (c) Misstatements may not be detected immediately because a batch computer system processes transactions in a batch or group, instead of individually. Therefore, there is a delay between the transaction and the processing while the transactions are accumulated. Choice (a) is incorrect because an error in one transaction will not cause the rejection of other transactions but rather the rejection of the entire batch until the errors are corrected. Choice (b) is incorrect because input controls typically are designed into the system to reduce the chance of errors being introduced when the transactions are entered. Choice (d) is incorrect because processing of transactions in a batch is intended to be uniform since all are processed at the same time by the same program.

62. (a) A limit test is designed to limit, for example, the number of hours an employee can be paid in any week and therefore ensure the reliability and accuracy of data processing. A validity check test is designed to check that an employee is a current employee (valid) before processing a payroll transaction for that person and therefore ensures the reliability and accuracy of data processing.

63. (b) Edit checks are computer-programmed routines that are designed to detect data entry errors. Accordingly, a direct output of the edit checks of sales data being entered into a system would be a file or list of all sales transactions rejected by the edit checks. Answers (a) and (d) are incorrect because missing sales invoices and voided shipping documents would not be reflected on output generated from edit checks on data entry because sales invoices and shipping documents are generated after sales data are entered into the system. Answer (c) is incorrect because a printout of user codes and passwords would relate to general controls over access rather than application controls over data entry.

64. (c) Validity checks are computer-programmed routines that determine whether or not a particular character is legitimate. An example of a validity check would be a comparison of input data fields to existing file records to determine if the characters being entered are valid. If the validity check is operating properly, the computer will flag any transmissions for which the control field value (input data) did not match that of an existing file record. Answer (a) is incorrect because it is an example of a limit test, which is a computerized check to determine that data values do not exceed or fall below some determined limit. Answer (b) is incorrect because it is an example of an error log, which is a record or listing of each rejected item. Answer (d) is incorrect because it is an example of a data entry or data conversion control, which determines that the data being entered agrees with the data originally sent.

65. (b) In order to prevent unauthorized program modification, the duties of analysts, programmers and operators should be segregated. Specifically, systems analysts and computer operators should not do the technical programming and should not have access to the programmer's work. Answer (a) is incorrect because review of utilization reports and system documentation may detect control problems but will not prevent control problems, such as EDP personnel modifying programs. Answer (c) is incorrect because designing new systems is unrelated to preventing program changes. Answer (d) is incorrect because limiting physical access to equipment may not prevent modification of programs if programs can be accessed from off-site.

66. (b) In a batch processing system, a record count is the number of items included in the batch to be processed.

67. (d) In a batch processing system, a hash total is the sum of items in the batch that are not usually totaled. In this question, if you add the invoice numbers, they total 810. The totaling of invoice numbers is an example of a hash total.

68. (d) Acme did not have security protecting access to the network. Answer (a) is incorrect because a router is a switching device linking incoming messages over the internet. Answer (b) is incorrect because it appears there were no passwords used. Answer (c) is incorrect because there is nothing in the data suggesting this happened. Jones would not necessarily be given root account access by Acme.

69. (a) Master files contain permanent data such as general ledger accounts. Answers (b), (c) and (d) are all examples of transaction files which are subsequently used to update the master file.

70. (c) The Delphi technique is used to avoid issues of group dynamics. Individuals are asked to privately answer a series of questions regarding some decision to be made. Answers are collected and responses sent to the individuals who are asked to respond to the suggestions. By repeating this process until a decision is made, groupthink can be avoided. Answers (a), (b) and (d) are quantitative methods used which require the use of mathematical equations. While some judgment is required, significantly more judgment is needed with the Delphi technique.

71. (d) Passwords limit unauthorized access to the system and data. Answers (a), (b) and (c) can occur with or without the use of passwords.

72. (c) A firewall is software used to prevent unauthorized access to information. It separates one segment from another. By placing a firewall on the application software rather than the entire network, it provides an additional layer of authentication to the data by the user at the specific application level.

Chapter Eleven

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Chapter Eleven

Cost Accounting: Actual Cost, Job Order and Process

BASICS

For financial accounting, the purpose of cost accounting is to determine the cost of a product or service. There are two basic cost accounting systems:

1. **Job Order**—Costs are accumulated by specific job or lot.
2. **Process**—Costs are accumulated by department or productive process and allocated to the units processed based upon a cost flow assumption (generally weighted average or FIFO).

(Standard cost can be applied to either system.)

The cost system used by an enterprise will be determined by the type of operations performed. A job order costing system is appropriate when custom made or unique goods or services are produced, such that direct costs can be identified with the specific units of production. Job order costing is often used in industries such as printing, construction, auto repair, furniture and machinery manufacture, and professional services. A process costing system is appropriate when the operation continuously mass produces like units, one unit being indistinguishable from another. Process costing is often used in industries such as chemicals, food processing, petroleum, mining, and in the manufacturing of other standard products.

Basic cost elements of production:

Direct (raw) materials: Cost of materials that become part of the finished product and are directly traceable to the finished product. Examples: the cost of paper used in printing books and wood used in making desks.

Direct labor: Cost of labor which works directly on the product, converting raw materials to a finished product, and is directly traceable to the finished product. Examples: wages of a printing press operator, or worker who assembles desks.

Overhead: All other manufacturing costs. These costs are indirectly related to production of the finished product. Other terms that are synonymous with overhead include: manufacturing or factory overhead, burden, indirect costs, and applied manufacturing expense. Examples include indirect materials (oil for machines), indirect labor (supervisor's wages), utilities and property taxes on the manufacturing facility.

Cost Classifications:

Prime cost: Direct material cost plus direct labor cost.

Conversion cost: Direct labor cost plus overhead cost.

Product cost: The sum of direct material, direct labor and overhead costs which comprise the inventoriable costs.

Period cost: Non-inventoriable cost which is expensed in the current period as incurred.

Variable cost: Costs which vary in total directly with changes in the level of activity. The cost per unit is constant at different levels of activity.

Fixed costs: Costs which remain constant in total, regardless of changes in the level of activity. Therefore, the per unit cost changes with changes in the level of operations.

Relevant range: The limits within which the level of activity may vary and the above variable and fixed cost-volume relationships will remain valid.

Basic cost accounting cost expiration computations:

Cost of Materials Used:

Beginning Inventory Material	\$ 12,000
Purchases	<u>280,000</u>
Total	\$292,000
Less: Ending Inventory Material	<u>15,000</u>
Cost of Materials Used	<u>\$277,000</u>

Cost of Goods Manufactured:

Beginning Work-in-Process Inventory	\$ 16,000
Direct Material	<u>277,000</u>
Direct Labor	<u>204,000</u>
Overhead	<u>306,000</u>
Total	\$803,000
Less: Ending Work-in-Process Inventory	<u>23,000</u>
Cost of Goods Manufactured	<u>\$780,000</u>

Cost of Goods Sold:

Beginning Finished Goods Inventory	\$ 81,000
Cost of Goods Manufactured	<u>780,000</u>
Goods Available for Sale	\$861,000
Less: Ending Finished Goods Inventory	<u>96,000</u>
Cost of Goods Sold	<u>\$765,000</u>

JOB ORDER COST

Accumulation of Costs

- a. Costs for each job or lot are accumulated on Job Cost sheets. Job cost sheets show cost of material and labor charged to the job based on actual cost. Overhead, however, cannot be charged to the job at actual—a predetermined rate must be used. A job cost sheet might appear as follows:

Job 525

Direct Material—18 lbs. @ \$4.50	\$ 81.00
Direct Labor—24 hrs. @ \$4.25	102.00
Mfg. Overhead—\$3 per labor hour	<u>72.00</u>
Cost of job charged to work-in-process	\$255.00

- b. An upward accumulation of job and departmental costs is maintained in plant or factory ledgers.
c. Control accounts are maintained in the General Ledger.

Activity Base Computation—Predetermined Rates

While actual direct material and direct labor costs can be readily obtained, the books must be closed to assign actual overhead costs to specific jobs. Jobs must be continually costed for billing and control purposes and such procedures could not be delayed until actual overhead is determined. Therefore, the predetermined overhead rate is used. The overhead rate chosen will vary with the type of manufacturing operation, but generally will be computed as follows:

$$\frac{\text{Budget Estimated Manufacturing Expense}}{\text{Budget Estimated Activity Base}}$$

The Activity Base ideally should be an activity or quantity that is closely related to changes in overhead cost. In this way an increase in the activity base will measure the resulting increase in overhead. Activity bases frequently used are:

- | | |
|------------------|-----------------------------|
| 1. Units | 4. Prime Cost (D.M. + D.L.) |
| 2. Material Cost | 5. Machine Hours |
| 3. Labor Cost | 6. Labor Hours |

Illustrative Problem—Computation of Predetermined Rate

The Jigsaw Company has three departments—Molding, Fabrication and Finishing. Budgeted costs and production data for the three departments are as follows:

<i>Department</i>	BUDGETED			
	<i>Material Cost</i>	<i>Labor Cost</i>	<i>Labor Hours</i>	<i>Manufacturing Expense</i>
Molding	\$12,000	\$6,000	1,200	\$18,000
Fabrication	6,000	4,000	800	8,000
Finishing	3,000	4,500	900	9,000

Compute overhead rates for each of the departments assuming management has selected overhead activity bases as follows:

- (1) Molding—Material Cost
- (2) Fabrication—Labor Cost
- (3) Finishing—Labor Hours

$$(1) \frac{\$18,000}{12,000} = 150\%$$

$$(2) \frac{\$8,000}{4,000} = 200\%$$

$$(3) \frac{\$9,000}{900} = \$10$$

Assume that Job #120 accumulated costs and labor hour data as follows:

	<u>Material</u>	<u>Labor</u>
Molding	\$80	7 hrs. @ \$5
Fabrication	\$30	3 hrs. @ \$6
Finishing	\$25	2 hrs. @ \$5.50

Determine the cost of Job #120 which is to be charged to Work in Process.

	<u>Molding</u>	<u>Fabrication</u>	<u>Finishing</u>	<u>Total</u>
Material	\$ 80	\$30	\$25	\$135
Labor	35	18	11	64
Overhead	(1) <u>120</u>	(2) <u>36</u>	(3) <u>20</u>	<u>176</u>
Total	\$235	\$84	\$56	\$375

- (1) $150\% \times \$80$
- (2) $200\% \times \$18$
- (3) $2 \times \$10$

In Job #120 we notice that work-in-process is charged with a total of \$375 and upon completion finished goods will be charged likewise.

Allocation of Service Department Costs

While Direct Material and Labor are at actual, the use of a predetermined rate for overhead will necessitate comparison with actual and, if done properly, can furnish management with some useful information, which we will consider later. Actual overhead costs are accumulated in the Manufacturing Expense Control Account to be compared with the overhead applied (predetermined rate) to the product. The accumulation of actual overhead costs is a relatively simple accounting matter in total; however, since these costs are indirect, they must be allocated to departments on some basis. Overhead costs that are directly attributable to a department or activity are, of course, assigned to that department or activity which is called a "cost center." Costs that are accumulated in service departments must ultimately be reallocated to the producing departments. The producing departments must ultimately bear all costs.

Illustrative Problem (Allocation of Service Department Costs)

The Edelweiss Co. has three producing departments, D, E and F. Costs are also accumulated in the Building Service, Power Plant, Maintenance and Personnel Departments. At the end of the period, overhead costs have been accumulated in these departments as follows:

	<i>Costs</i>
Department D	\$ 22,420
Department E	28,760
Department F	39,880
Building Service	13,000
Power Plant	16,000
Maintenance	19,000
Personnel	<u>4,000</u>
Total Costs	<u>\$143,060</u>

Other data is also given concerning these departments:

	<i>Departments</i>							Total
	D	E	F	B/S	P/P	M	P	
Number of employees	16	22	32	4	12	18	6	110
Floor space	1,200	1,800	3,000	—	1,600	1,400	1,000	10,000
Power used—Kilowatt Hours	12,000	16,000	18,000	—	—	4,000	—	50,000
Machine Hours	3,600	2,400	4,000	—	—	—	—	10,000

If we use the step method, we can close out the departments one by one. There are no rules except common sense in determining the basis of allocation. The above shows an obvious relationship. In some situations considerable judgment may be required and the allocation basis can be quite complex. When a service department's costs are allocated, no reallocation of costs is made to that department.

Solution:

1. Allocate building service costs to all departments. (Floor Space)
2. Allocate personnel costs to all other departments. (Number of Employees)
3. Allocate power plant costs to the producing departments and maintenance. (Power Used)
4. Allocate maintenance costs to the producing departments. (Machine Hours)

Allocation of Costs

<i>Producing Departments</i>							
<i>D</i>	<i>E</i>	<i>F</i>	<i>B/S</i>	<i>P/P</i>	<i>M</i>	<i>P</i>	<i>Total</i>
\$22,420	\$28,760	\$39,880	\$13,000	\$16,000	\$19,000	\$4,000	\$143,060
1,560	2,340	3,900	<u>(\$13,000)</u>	2,080	1,820	<u>1,300</u>	
						5,300	
848	1,166	1,696		<u>636</u>	954	<u>(\$5,300)</u>	
				18,716			
4,490	5,990	6,736		<u>(\$18,716)</u>	<u>1,500</u>		
					23,274		
<u>8,378</u>	<u>5,586</u>	<u>9,310</u>			<u>(\$23,274)</u>		
<u>\$37,696</u>	<u>\$43,842</u>	<u>\$61,522</u>					<u>\$143,060</u>

Note: This is not the only possible solution to the problem. As no basis of allocation was specified, any systematic and rational allocation can be used.

There are other methods of allocating departmental overhead costs such as the direct method, where costs of non-producing departments are allocated directly to producing departments. Another more complicated method can be used where service departments perform services for each other such as the above problem in that the Personnel and Building Service Departments perform services for each other. Solving this type of problem, giving recognition to this fact requires the use of simultaneous equations. While more accurate than the step method, it is not widely used in practice, because the difference in results is usually not significant.

Application of Overhead to the Product—Overhead Over and Under Applied.

We have seen that Direct Costs, Material and Labor are applied to the product based on actual costs, but because costs must be assigned to the product before actual overhead can be determined and allocated, a predetermined rate is used for overhead. Later, when actual overhead is determined, the difference between actual and estimated results in an over or under application of overhead to the product, such as:

- a. If actual overhead exceeds the overhead applied by means of a rate, this results in overhead being underapplied.
- b. If actual overhead is less than the overhead applied to the product, this results in overhead being overapplied.

The over- or under-applied overhead, if material, should be allocated to work-in-process, finished goods, and cost of goods sold to adjust these balances to full cost in accordance with GAAP. If immaterial, the over- or under-applied overhead is usually treated as an adjustment to the cost of goods sold.

Actual overhead costs are accumulated in the Manufacturing Expense Control Account.

Journal entries typically leading up to this situation are as follows:

Stores	(1)	Material is purchased for plant use.
Accounts Payable		
W in P—Direct Material	(2)	Materials are requisitioned for use in the plant,
Mfg. Exp. Control		some as direct material. Material overhead costs
Stores		are charged to Mfg. Exp. Control.
Payroll	(3)	Wages are paid.
Cash		
Sundry payroll tax credits		

W in P—Direct Labor Mfg. Exp. Control Payroll	(4)	Wages are assigned to the product (direct) or charged to actual overhead (indirect).
Mfg. Exp. Control Sundry Credits Allowance for Depreciation	(5)	Overhead costs are charged to Mfg. Exp. Control such as rent, insurance, taxes and depreciation.
W in P Overhead Dept. 1 W in P Overhead Dept. 2 W in P Overhead Dept. 3 Mfg. Overhead Applied Dept. 1 Mfg. Overhead Applied Dept. 2 Mfg. Overhead Applied Dept. 3	(6)	Overhead charged to product based on the predetermined rate is recorded. An alternate method would be to credit "Mfg. Exp." directly. If this is done entry 8 would be unnecessary.
Mfg. Exp. Dept. 1 Mfg. Exp. Dept. 2 Mfg. Exp. Dept. 3 Mfg. Exp. Control	(7)	Mfg. Exp. Control is closed out to the departments based on the company's method of allocating actual costs to the producing departments.
Mfg. Overhead Applied Dept. 1 Mfg. Overhead Applied Dept. 2 Mfg. Overhead Applied Dept. 3 Mfg. Exp. Dept. 1 Mfg. Exp. Dept. 2 Mfg. Exp. Dept. 3	(8)	Mfg. Overhead applied is closed out to Mfg. Expense. Differences result in Mfg. Exp. Over/Under Applied.
Mfg. Exp. Dept. 1 Mfg. Exp. Dept. 2 Mfg. Exp. Dept. 3 Mfg. Exp. Over/Under Applied	(9)	Difference between actual and applied overhead as indicated by the results of entry #8.

Flexible Budgets and Overhead Analysis

Flexible budgeting is a reporting system wherein the planned level of activity is adjusted to the actual level of activity before the budget to actual comparison report is prepared. It may appropriately be employed for any item which is affected by the level of activity.

Assume that F Co. has a flexible budget as follows:

<i>Percent of Normal</i>	<u>80%</u>	<u>90%</u>	<u>100%</u>	<u>110%</u>
Fixed Cost	\$10,000	\$10,000	\$10,000	\$10,000
Variable	12,000	13,500	<u>15,000</u>	16,500
			\$25,000	
 Direct labor hours	 16,000	 18,000	 20,000	 22,000

Predetermined Rate—\$1.25 per labor hour @ 100% (\$.50 FC + \$.75 VC) or ($\$25,000 \div 20,000$ D.L. hrs.)

During the period the plant operated at 92% of normal and incurred overhead costs of \$23,960. For management information purposes the manufacturing expense over/under applied account can be analyzed and broken up into two variances—a budget variance and a volume or capacity variance.

Overhead Analysis

	(Unfavorable) DR	(Favorable) CR
Actual Overhead	\$23,960	
Budget Variance		
Budget at actual direct labor hours		
92% × 20,000 hrs. = 18,400 hrs.		
FC (20,000 × .50)	10,000	
VC (18,400 × .75)	<u>13,800</u>	
	<u>23,800</u>	\$160
Volume or Capacity Variance		
Mfg. Overhead Applied		
FC 18,400 × .50	9,200	
VC 18,400 × .75	<u>13,800</u>	
	<u>23,000</u>	*800
Total Variance	<u>\$ 960</u>	<u>\$960</u>

*Caused by volume falling short of normal by 1,600 hours at .50 per hour (FC rate).

PROCESS COST

Basics

In process cost a continuous flow of product is assumed and under ordinary conditions the cost per unit would not change significantly from period to period. Cost computations, admittedly oversimplified, can be expressed as follows:

$$\frac{\begin{matrix} 4/1 & & 4/30 \\ \text{PERIOD COSTS M, L \& OH} \\ \text{UNITS PRODUCED} \end{matrix}}{\text{UNITS PRODUCED}} = \text{UNIT COST}$$

Things get complicated, however, because of beginning and ending inventories of work-in-process and the assumptions under which costs are assigned. In process cost, we may compute costs using FIFO or weighted average. Where there is no beginning inventory, there is no difference in the two inventory methods. The basic steps in working process cost problems for both the FIFO and weighted average methods is shown in five steps. Note that step four is called a "cost of production report" which simply stated is the computation of inventory costs for finished product and the ending inventory of work-in-process. Step 5 is not usually a required step, but a check to determine if prior computations are correct. Treatment for spoiled units is covered after Process Cost Procedure.

Process Cost Procedure

1. Account for all units (do not use equivalents)

Beginning Inventory
 + units started
 – transferred out
 – lost
 – ending inventory
 = zero

If one item is missing, for example, lost units, the number lost will be the number used to equal zero.

2. Compute equivalent finished units (EFU)

<u>FIFO</u>		<u>Average</u>
Finished Units		Finished
+Ending Inventory ¹	+Beginning Inventory ³	+Ending Inv. ¹
+Abnormal Spoilage ¹	+Units started and finished ⁴	+Abnormal Spoilage ¹
-Beginning Inventory ²	+Abnormal Spoilage ¹	
	+Ending Inventory ¹	

¹Units × % complete

²Units × % complete at beginning of period

³Units × % completed during the current period (100% – the % complete at beginning of inventory)

⁴Finished units – beginning inventory units (not equivalents)

Separate EFU's may have to be computed for material, labor, overhead and prior department costs.

3. Compute unit costs. Set up a schedule as follows:

	<u>Period Cost</u>	÷	<u>FIFO</u> <u>EFU</u>	=	<u>Unit Cost</u>
Material	xxxx		xxx		xx
Labor	xxxx		xxx		xx
Overhead	xxxx		xxx		xx
Departmental unit cost					xx
Prior dept. cost (if applicable)	xxxx		xxxx		xx
Total unit cost					xx

**AVERAGE
COST**

	<u>Beg. Inv.</u>	+ <u>Period</u>	= <u>Total</u>	÷ <u>EFU</u>	= <u>Unit Cost</u>
Material	xxxx	xxxx	xxxx	xxx	xx
Labor	xxxx	xxxx	xxxx	xxx	xx
Overhead	xxxx	xxxx	xxxx	xxx	xx
Departmental Unit Cost					xx
Prior Dept. Cost	xxxx	xxxx	xxxx	xxxx	<u>xx</u>
Total Unit Cost					xx

4. Cost of Production Report—FIFO. In FIFO, the cost flow assumption is that the beginning inventory cost flows through first. Therefore, the first step is to complete the beginning inventory.

Cost of units finished and transferred out	
Beginning inventory costs	xxx (1)
+ Cost to complete	
(units × % completed this period × unit cost)	<u>xxx</u> (2)
Total cost of beginning inventory units	xxx
+ Cost of units started and finished	
(finished – beginning inventory) × total unit cost	<u>xxx</u>
Cost of units finished and transferred out	xxx
Cost of ending work-in-process inventory	
Units × % complete × unit cost	xxx (3)
Cost of abnormal spoilage (loss)	
Units × % complete × unit cost	<u>xxx</u> (3)
Total manufacturing costs accounted for	<u>xxx</u>

- (1) Includes material, labor, overhead and, if applicable, prior department costs.
- (2) Separate computations may be required for material, labor, and overhead costs. NOTE: Prior department costs would **not** be applied as they are already included in the beginning inventory if applicable.
- (3) Separate computations may be required for material, labor, overhead and prior department costs.

Cost of Production Report—Average. In average, costs and units are not isolated for the period, but instead, beginning inventory costs and units are merged as can be seen in the unit cost computation in Step 3.

Cost of units finished and transferred out	
Units × total unit cost	xxx
Cost of ending work-in-process inventory	
Units × % complete × unit cost	xxx (1)
Cost of abnormal spoilage (loss)	
Units × % complete × unit cost	<u>xxx</u> (1)
Total manufacturing costs accounted for	<u>xxx</u>

- (1) Separate computations may be required for material, labor, overhead and prior department costs.

5. Costs to be accounted for:

Dr. Beginning inventory	Cr. Finished transferred
Period costs (M, L and OH)	Finished remaining
Prior dept. costs	Ending inventory
	Lost units (if computed separately)

Treatment of Spoiled Units (Lost, Defective, Spoiled, etc.)

1. Abnormal spoilage should be computed as a separate cost and written off as a period loss.
2. Normal spoilage is included in production costs for the period as follows:
 - a. Units lost during production are simply ignored in the computation of the EFU and their period costs will be absorbed by the units produced including both finished good units and ending inventory of work-in-process.

Note: If the problem is silent as to when units are lost, assume loss at beginning of process.
 - b. When units are transferred in from another department, it will be necessary to compute a new unit cost, such as:

18,000 units transferred from B to C at a cost of \$36,000; 2,000 units were lost at the beginning of the process. The new unit cost becomes $\$36,000 \div 16,000$, or \$2.25.

At times problems may ask for a lost unit adjustment computation. In the foregoing situation this would be computed as follows:

Transferred-in Unit Cost	\$2.00
Lost unit adjustment	
$18,000 - 16,000 = 2,000$ lost	
$2,000 \times \$2.00 = \$4,000 \div 16,000 =$	<u>.25</u>
New unit cost	<u>\$2.25</u>

Note to Students: Cost accounting textbooks vary in their treatment of units normally lost in production. Some advocate computing a cost on the lost units and adding such cost to the good units. Others recommend ignoring the lost units, thus having the effect of spreading the cost over both the finished and ending inventory work in process. If you are instructed in a problem to compute a cost on lost units, you must include the lost units in the EFU to the extent such lost units were completed.

Exercises

- 20,000 units were started in the department, 8,000 were in process one-half complete at the end of the month, 27,000 were completed and 4,000 were found defective. How many units were in process at the beginning of the month? _____
- 26,000 units were transferred into the department. Units in process at the beginning of the month, one-third complete, 18,000. At the end of the month 12,000 units were in process, three-fourths complete. 1,000 units were lost and 31,000 were finished and transferred. Compute the EFU for FIFO assuming that:
 - Material is added as work in process _____
 - Material is added at the beginning of processing _____
 - Material is added at the end of the process _____
 Compute the EFU for average costing purposes assuming that
 - Material is added when the process is one-half complete _____
 - Material is added at the beginning of processing _____
- 15,000 units were transferred in from the mixing department to cooking at a cost of \$28,000. Beginning units totaled 6,000 at a cost of \$13,000. One-thousand units were lost. Compute the transferred-in costs per unit for FIFO costing purposes. _____
 Make the same computation for average costing purposes. _____

Solutions to Exercises

1. 19,000; 2. (a) 34,000, (b) 25,000, (c) 31,000, (d) 43,000, (e) 43,000; 3. \$2.00, \$2.05.

Process Cost Illustrative Problem

The Joy Manufacturing Co. manufactures a single product that passes through two departments: extruding and finishing-packing. The product is shipped at the end of the day that it is packed in the finishing-packing department. The production in the extruding and finishing-packing departments does not increase the number of units started.

The cost and production data for the finishing-packing department for the month of January are as follows:

<u>Cost Data</u>	<u>Finishing- Packing Dept.</u>
Work in process, January 1:	
Cost from preceding department	\$34,500
Material	\$14,750
Labor	15,800
Overhead	6,230
Costs added during January:	
Cost from preceding department	93,500
Material	41,250
Labor	48,800
Overhead	23,370
Percentage of completion of work in process	
January 1:	
Material	100%
Labor	60%
Overhead	50%
January 31:	
Material	100%
Labor	80%
Overhead	70%

January Production Statistics

Units in process, January 1	5,000
Units in process, January 31	4,000
Units received from prior department	13,000
Units completed and transferred or shipped	12,000

Required: Compute each of the following assuming the company uses A) FIFO and B) Weighted Average Process Cost:

1. Account for all units.
2. Compute the equivalent finished units for material, labor, overhead, and prior department costs.
3. Compute the unit cost.
4. Prepare a cost of production summary.
5. Show all the debits to the Work-in-Process account, all credits and reconcile the balance to the ending inventory of work-in-process computed in (4) above.

Solution: A) FIFO

Step #1

	<u>Finishing-Packing</u>
In Process 1/1	5,000
Started	<u>13,000</u>
Total units to account for	<u>18,000</u>
Completed	12,000
In Process 1/31	4,000
Lost in Production	<u>2,000</u>
Total units accounted for	<u>18,000</u>

Step #2—EFU (FIFO)

		<u>Material</u>	<u>Finishing-Packing</u>		<u>Prior Dept.</u>
			<u>Labor</u>	<u>Overhead</u>	
Finished		12,000	12,000	12,000	12,000
+ Ending Inv.	4000 × 100%	4,000			
	4000 × 80%		3,200		
	4000 × 70%			2,800	
	4000 × 100%	16,000	15,200	14,800	4,000
- Beginning Inv.	5000 × 100%	(5,000)			16,000
	5000 × 60%		(3,000)		
	5000 × 50%			(2,500)	
	5000 × 100%	(5,000)			(5,000)
EFU - FIFO		<u>11,000</u>	<u>12,200</u>	<u>12,300</u>	<u>11,000</u>

Step #3—Unit Cost

	<u>Period Cost</u>	<u>EFU</u>	<u>Unit Cost</u>
M	\$41,250	11,000	\$ 3.75
L	48,800	12,200	4.00
OH	23,370	12,300	<u>1.90</u>
			\$ 9.65
Transferred in costs	\$93,500	11,000	<u>8.50</u>
			<u>\$18.15</u>

Step #4—Cost of Production Report

Cost of Finished Units

Opening WIP Costs 1/1 (34,500 + 14,750 + 15,800 + 6,230)	\$ 71,280	
Cost to Complete		
Material 5,000 × 0% × \$3.75	—	
Labor 5,000 × 40% × \$4.00	8,000	
Overhead 5,000 × 50% × \$1.90	4,750	
Prior Dept. 5,000 × 0% × 8.50	—	
Cost of 5,000 complete units	\$ 84,030	
Add: Cost of units started and finished during January		
7,000 × \$18.15	<u>127,050</u>	
Cost of 12,000 finished units		\$211,080

Cost of WIP 1/31

Material 4,000 × 100% × \$3.75	\$ 15,000	
Labor 4,000 × 80% × \$4.00	12,800	
Overhead 4,000 × 70% × \$1.90	5,320	
Transferred in Costs 4,000 × 100% × \$8.50	<u>\$ 34,000</u>	
		<u>67,120</u>

Total manufacturing cost accounted for \$278,200

Step #5—Costs To Be Accounted For

<u>Costs</u>	<u>Finishing-Packing</u>
Beginning Inventory	\$ 71,280
Period Costs	<u>206,920</u>
	<u>\$278,200</u>
Transfers from WIP	\$211,080
Ending Inventory WIP	<u>67,120</u>
	<u>\$278,200</u>

Solution: B) Weighted Average

Step #1

	<u>Finishing-Packing</u>
	<u>Department</u>
Units in process, January 1	5,000
Units received from preceding department	<u>13,000</u>
Total units to be accounted for	<u>18,000</u>
Units completed and transferred or shipped	12,000
Units in process, January 31	4,000
Units lost during January	<u>2,000</u>
Total units accounted for	<u>18,000</u>

Step #2—EFU (Weighted Average)

	<u>Finishing-Packing</u>			<u>Prior Dept.</u>
	<u>Material</u>	<u>Labor</u>	<u>Overhead</u>	
Finished	12,000	12,000	12,000	12,000
+Ending Inventory				
4000 × 100%	4,000			
4000 × 80%		3,200		
4000 × 70%			2,800	
4000 × 100%				4,000
EFU Weighted Average	<u>16,000</u>	<u>15,200</u>	<u>14,800</u>	<u>16,000</u>

Step #3—Unit Cost

<u>Finishing-Packing Dept.</u>	<u>Costs</u>			<u>EFU</u>	<u>Unit Cost</u>
	<u>Beg. Inv.</u>	<u>Period</u>	<u>Total</u>		
M	\$14,750	\$41,250	\$56,000	16,000	\$3.50
L	15,800	48,800	64,600	15,200	4.25
OH	6,230	23,370	29,600	14,800	2.00
Preceding Dept.					
Costs	\$34,500	\$93,500	<u>128,000</u>	16,000	<u>8.00</u>
Total manufacturing costs			<u>\$278,200</u>		<u>\$17.75</u>

Step #4—Cost of Production Report

Cost of Finished Units

12,000 units × \$17.75 \$213,000

Cost of WIP 1/31

Material	4000 × 100% × \$3.50	\$14,000	
Labor	4000 × 80% × \$4.25	13,600	
Overhead	4000 × 70% × \$2.00	5,600	
Prior Dept.	4000 × 100% × \$8.00	<u>32,000</u>	<u>65,200</u>

Total manufacturing costs accounted for \$278,200

ACTIVITY BASED COSTING:

Activity Based Costing is a method of assigning costs to goods and services that assumes all costs are caused by the activities (cost drivers) used to produce those goods and services. ABC first relates costs to the activities that cause the costs (cost drivers), then assigns costs to products/services based upon their use of those activities (cost driver) in production. ABC results in the use of multiple predetermined rates for overhead costs as companies engage in many different activities that cause overhead cost (multiple cause/effect relationships exist within a company for overhead costs). As a result, ABC provides more detailed measures of cost than departmental or plantwide allocation methods.

Advantages of ABC include:

- Provide more insight into the causes of cost. Managers must know: 1) the activities that go into making the good/service and 2) the cost of those activities to employ ABC.
- Stresses cost control results from control of activities. ABC is based on the concept that the production of goods and services consumes activities, and activities consume economic resources (costs).
- Promotes improved quality/continuous improvement. Nonvalue-added activities (cost drivers), such as movement, storage, set up, inspection, defective rework are minimized or eliminated.

Chapter Eleven

Cost Accounting Questions

Actual Cost, Job Order and Process

Items 1 through 4 are based on the following information:

	<i>Fabrication</i>	<i>Assembly</i>	<i>General Factory Administration</i>	<i>Factory Maintenance</i>	<i>Factory Cafeteria</i>
Direct-labor costs	\$1,950,000	\$2,050,000	\$90,000	\$82,100	\$87,000
Direct-material costs	\$3,130,000	\$950,000	—	\$65,000	\$91,000
Manufacturing-overhead	\$1,650,000	\$1,850,000	\$70,000	\$56,100	\$62,000
Direct-labor hours	562,500	437,500	31,000	27,000	42,000
Number of employees	280	200	12	8	20
Square-footage occupied	88,000	72,000	1,750	2,000	4,800

The Parker Manufacturing Company has two production departments (fabrication and assembly) and three service departments (general factory administration, factory maintenance, and factory cafeteria.) A summary of costs and other data for each department prior to allocation of service-department costs for the year ended June 30, 19X3, appears above.

The costs of the general-factory-administration department, factory-maintenance department, and factory cafeteria are allocated on the basis of direct-labor hours, square-footage occupied, and number of employees, respectively. There are no manufacturing-overhead variances. **Round all final calculations to the nearest dollar.**

1. Assuming that Parker elects to distribute service-department costs directly to production departments without interservice department cost allocation, the amount of factory-maintenance department costs which would be allocated to the fabrication department would be

- \$0.
- \$111,760.
- \$106,091.
- \$91,440.

2. Assuming the same method of allocation as in item 1, the amount of general-factory-administration department costs which would be allocated to the assembly department would be

- \$0.
- \$63,636.
- \$70,000.
- \$90,000.

3. Assuming that Parker elects to distribute service-department costs to other service departments (starting with the service department with the greatest total costs) as well as the production departments, the amount of factory-cafeteria department costs which would be allocated to the factory-maintenance department would be (**Note:** Once a service department's costs have been reallocated, no subsequent service-department costs are recirculated back to it.)

- \$0.
- \$96,000.
- \$3,840.
- \$6,124.

4. Assuming the same method of allocation as in item 3, the amount of factory-maintenance department costs which would be allocated to the factory cafeteria would be

- \$0.
- \$5,787.
- \$5,856.
- \$148,910.

5. Which measures would be useful in evaluating the performance of a manufacturing system?

- Throughput time.
 - Total setup time for machines/Total production time.
 - Number of rework units/Total number of units completed.
- I and II only.
 - II and III only.
 - I and III only.
 - I, II, and III.

6. Gram Co. develops computer programs to meet customers' special requirements. How should Gram categorize payments to employees who develop these programs?

	<u>Direct costs</u>	<u>Value-adding costs</u>
a.	Yes	Yes
b.	Yes	No
c.	No	No
d.	No	Yes

7. Spoilage occurring during a manufacturing process can be considered normal or abnormal. The proper accounting for each of these costs is

	<u>Normal</u>	<u>Abnormal</u>
a.	Product	Period
b.	Product	Product
c.	Period	Product
d.	Period	Period

8. In developing a predetermined factory overhead application rate for use in a process costing system, which of the following could be used in the numerator and denominator?

	<u>Numerator</u>	<u>Denominator</u>
a.	Actual factory overhead.	Actual machine hours.
b.	Actual factory overhead.	Estimated machine hours.
c.	Estimated factory overhead.	Actual machine hours.
d.	Estimated factory overhead.	Estimated machine hours.

9. Following are Mill Co.'s production costs for October:

Direct materials	\$100,000
Direct labor	90,000
Factory overhead	4,000

What amount of costs should be traced to specific products in the production process?

- a. \$194,000
- b. \$190,000
- c. \$100,000
- d. \$90,000

10. Direct labor cost is a

	<u>Conversion cost</u>	<u>Prime cost</u>
a.	No	No
b.	No	Yes
c.	Yes	Yes
d.	Yes	No

11. What is the normal effect on the numbers of cost pools and allocation bases when an activity-based cost (ABC) system replaces a traditional cost system?

	<u>Cost pools</u>	<u>Allocation bases</u>
a.	No effect	No effect
b.	Increase	No effect
c.	No effect	Increase
d.	Increase	Increase

12. Under the two-variance method for analyzing overhead, which of the following variances consists of both variable and fixed overhead elements?

	<u>Controllable (budget) variance</u>	<u>Volume variance</u>
a.	Yes	Yes
b.	Yes	No
c.	No	No
d.	No	Yes

13. The Forming Department is the first of a two-stage production process. Spoilage is identified when the units have completed the Forming process. Costs of spoiled units are assigned to units completed and transferred to the second department in the period spoilage is identified. The following information concerns Forming's conversion costs in May 1995:

	<u>Units</u>	<u>Conversion Costs</u>
Beginning work-in-process (50% complete)	2,000	\$10,000
Units started during May	8,000	75,500
Spoilage—normal	500	
Units completed & transferred	7,000	
Ending work-in-process (80% complete)	2,500	

Using the weighted average method, what was Forming's conversion cost transferred to the second production department?

- a. \$59,850
- b. \$64,125
- c. \$67,500
- d. \$71,250

14. In an activity-based costing system, what should be used to assign a department's manufacturing overhead costs to products produced in varying lot sizes?

- a. A single cause and effect relationship.
- b. Multiple cause and effect relationships.
- c. Relative net sales values of the products.
- d. A product's ability to bear cost allocations.

15. During the month of March 1992, Nale Co. used \$300,000 of direct materials. At March 31, 1992, Nale's direct materials inventory was \$50,000 more than it was at March 1, 1992. Direct material purchases during the month of March 1992 amounted to

- a. \$0
- b. \$250,000
- c. \$300,000
- d. \$350,000

16. A direct labor overtime premium should be charged to a specific job when the overtime is caused by the

- a. Increased overall level of activity.
- b. Customer's requirement for early completion of job.
- c. Management's failure to include the job in the production schedule.
- d. Management's requirement that the job be completed before the annual factory vacation closure.

17. The fixed portion of the semivariable cost of electricity for a manufacturing plant is a

	<u>Period cost</u>	<u>Product cost</u>
a.	Yes	No
b.	Yes	Yes
c.	No	Yes
d.	No	No

18. Baker Co., a manufacturer, had inventories at the beginning and end of its current year as follows:

	<u>Beginning</u>	<u>End</u>
Raw materials	\$22,000	\$30,000
Work in process	40,000	48,000
Finished goods	25,000	18,000

During the year the following costs and expenses were incurred:

Raw materials purchased	\$300,000
Direct-labor cost	120,000
Indirect factory labor	60,000
Taxes and depreciation on factory building	20,000
Taxes and depreciation on salesroom and office	15,000
Salesmen's salaries	40,000
Office salaries	24,000
Utilities (60% applicable to factory, 20% to salesroom, 20% to office)	50,000

Baker's cost of goods sold for the year is

- a. \$514,000.
- b. \$521,000.
- c. \$522,000.
- d. \$539,000.

19. When should process-costing techniques be used in assigning costs to products?

- a. If the product is manufactured on the basis of each order received.
- b. When production is only partially completed during the accounting period.
- c. If the product is composed of mass-produced homogeneous units.
- d. In situations where standard costing techniques should **not** be used.

20. Nile Co.'s cost allocation and product costing procedures follow activity-based costing principles. Activities have been identified and classified as being either value-adding or nonvalue-adding as to each product. Which of the following activities, used in Nile production process, is nonvalue-adding?

- a. Design engineering activity.
- b. Heat treatment activity.
- c. Drill press activity.
- d. Raw materials storage activity.

21. A job order cost system uses a predetermined factor overhead rate based on expected volume and expected fixed cost. At the end of the year, underapplied overhead might be explained by which of the following situations?

	<u>Actual volume</u>	<u>Actual fixed costs</u>
a.	Greater than expected	Greater than expected
b.	Greater than expected	Less than expected
c.	Less than expected	Greater than expected
d.	Less than expected	Less than expected

22. In order to compute equivalent units of production using the FIFO method of process costing, work for the period must be broken down to units

- Completed during the period and units in ending inventory.
- Completed from beginning inventory, started and completed during the month, and units in ending inventory.
- Started during the period and units transferred out during the period.
- Processed during the period and units completed during the period.

23. A process costing system was used for a department that began operations in January 1991. Approximately the same number of physical units, at the same degree of completion, were in work in process at the end of both January and February. Monthly conversion costs are allocated between ending work in process and units completed. Compared to the FIFO method, would the weighted average method use the same or a greater number of equivalent units to calculate the monthly allocations?

Equivalent units for weighted average compared to FIFO

	<u>January</u>	<u>February</u>
a.	Same	Same
b.	Greater number	Greater number
c.	Greater number	Same
d.	Same	Greater number

24. Walton, Incorporated, had 8,000 units of work in process in Department A on October 1, 19X8. These units were 60% complete as to conversion costs. Materials are added in the beginning of the process. During the month of October, 34,000 units were started and 36,000 units completed. Walton had 6,000 units of work in process on October 31, 19X8. These units were 80% complete as to conversion costs. By how much did the equivalent units for the month of October using the weighted-average method exceed the equivalent units for the month of October using the first-in, first-out method?

	<u>Materials</u>	<u>Conversion Costs</u>
a.	0	3,200
b.	0	4,800
c.	8,000	3,200
d.	8,000	4,800

25. Information for the month of May concerning Department A, the first stage of Wit Corporation's production cycle, is as follows:

	<u>Materials</u>	<u>Conversion Costs</u>
Work in process, beginning	\$ 4,000	\$ 3,000
Current costs	<u>20,000</u>	<u>16,000</u>
Total costs	<u>\$24,000</u>	<u>\$19,000</u>
Equivalent units based on weighted-average method	<u>100,000</u>	<u>95,000</u>
Average unit costs	<u>\$ 0.24</u>	<u>\$0.20</u>
Goods completed		90,000 units
Work in process, end		10,000 units

Material costs are added at the beginning of the process. The ending work in process is 50% complete as to conversion costs. How would the total costs accounted for be distributed, using the weighted-average method?

	<u>Goods Completed</u>	<u>Work in Process, End</u>
a.	\$39,600	\$3,400
b.	\$39,600	\$4,400
c.	\$43,000	\$0
d.	\$44,000	\$3,400

26. The Wiring Department is the second stage of Flem Company's production cycle. On May 1, the beginning work in process contained 25,000 units which were 60% complete as to conversion costs. During May, 100,000 units were transferred in from the first stage of Flem's production cycle. On May 31, the ending work in process contained 20,000 units which were 80% complete as to conversion costs. Material costs are added at the end of the process. Using the weighted-average method, the equivalent units were

	<u>Transferred-in</u> <u>Costs</u>	<u>Materials</u>	<u>Conversion</u> <u>Costs</u>
a.	100,000	125,000	100,000
b.	125,000	105,000	105,000
c.	125,000	105,000	121,000
d.	125,000	125,000	121,000

27. The Cutting Department is the first stage of Mark Company's production cycle. Conversion costs for this department were 80% complete as to the beginning work-in-process and 50% complete as to the ending work-in-process. Information as to conversion costs in the Cutting Department for January is as follows:

	<u>Units</u>	<u>Conversion</u> <u>costs</u>
Work-in-process at January 1	25,000	\$ 22,000
Units started and costs incurred during January	135,000	\$143,000
Units completed and transferred to next department during January	100,000	

Using the FIFO method, what was the conversion cost of the work-in-process in the Cutting Department at January 31?

- a. \$33,000.
- b. \$38,100.
- c. \$39,000.
- d. \$45,000.

28. Under Heller Company's job order cost system, estimated costs of defective work (considered normal in the manufacturing process) are included in the predetermined factory overhead rate. During March, Job No. 210 for 2,000 hand saws was completed at the following costs per unit:

Direct materials	\$ 5
Direct labor	4
Factory overhead (applied at 150% of direct-labor cost)	<u>6</u>
	<u>\$15</u>

Final inspection of Job No. 210 disclosed 100 defective saws which were reworked at a cost of \$2 per unit for direct labor, plus overhead at the predetermined rate. The defective units on Job No. 210 fall within the normal range. What is the total rework cost and to what account should it be charged?

	<u>Rework cost</u>	<u>Account charged</u>
a.	\$200	Work-in-process
b.	\$200	Factory overhead control
c.	\$500	Work-in-process
d.	\$500	Factory overhead control

29. In its April 1995 production, Hern Corp., which does not use a standard cost system, incurred total production costs of \$900,000, of which Hern attributed \$60,000 to normal spoilage and \$30,000 to abnormal spoilage. Hern should account for this spoilage as

- a. Period cost of \$90,000.
- b. Inventoriable cost of \$90,000.
- c. Period cost of \$60,000 and inventoriable cost of \$30,000.
- d. Inventoriable cost of \$60,000 and period cost of \$30,000.

Items 30 through 32 are based on the following data pertaining to Lam Co.'s manufacturing operations:

<u>Inventories</u>	<u>4/1/87</u>	<u>4/30/87</u>
Direct materials	\$18,000	\$15,000
Work-in-process	9,000	6,000
Finished goods	27,000	36,000

Additional information for the month of April 1987:

Direct materials purchased	\$42,000
Direct labor payroll	30,000
Direct labor rate per hour	\$ 7.50
Factory overhead rate per direct labor hour	10.00

30. For the month of April 1987, prime cost incurred was

- a. \$75,000
- b. \$69,000
- c. \$45,000
- d. \$39,000

31. For the month of April 1987, conversion cost incurred was

- a. \$30,000
- b. \$40,000
- c. \$70,000
- d. \$72,000

32. For the month of April 1987, cost of goods manufactured was

- a. \$118,000
- b. \$115,000
- c. \$112,000
- d. \$109,000

33. Brooks Company uses the following flexible budget formula for the annual maintenance cost in department T:

$$\text{Total cost} = \$7,200 + \$0.60 \text{ per machine hour}$$

The July operating budget is based upon 20,000 hours of planned machine time. Maintenance cost included in this flexible budget is

- a. \$11,400
- b. \$12,000
- c. \$12,600
- d. \$19,200

34. Walden Company has a process cost system using the FIFO cost flow method. All materials are introduced at the beginning of the process in department One. The following information is available for the month of January:

	<u>Units</u>
Work-in-process, 1/1 (40% complete as to conversion costs)	500
Started in January	2,000
Transferred to department Two during January	2,100
Work-in-process, 1/31 (25% complete as to conversion costs)	400

What are the equivalent units of production for the month of January?

	<u>Materials</u>	<u>Conversion</u>
a.	2,500	2,200
b.	2,500	1,900
c.	2,000	2,200
d.	2,000	2,000

35. The following information was taken from Cody Co.'s accounting records for the year ended December 31, 1989:

Decrease in raw materials inventory	\$ 15,000
Increase in finished goods inventory	35,000
Raw materials purchased	430,000
Direct labor payroll	200,000
Factory overhead	300,000
Freight-out	45,000

There was no work-in-process inventory at the beginning or end of the year. Cody's 1989 cost of goods sold is

- a. \$895,000
- b. \$910,000
- c. \$950,000
- d. \$955,000

36. Axe Co. has a job order cost system. The following debits (credits) appeared in the work-in-process account for the month of March 1989:

<u>March</u>	<u>Description</u>	<u>Amount</u>
1	Balance	\$ 2,000
31	Direct materials	12,000
31	Direct labor	8,000
31	Factory overhead	6,400
31	To finished goods	(24,000)

Axe applies overhead to production at a predetermined rate of 80% based on direct labor cost. Job No. 9, the only job still in process at the end of March 1989, has been charged with direct labor of \$1,000. The amount of direct materials charged to Job No. 9 was

- \$12,000
- \$4,400
- \$2,600
- \$1,500

Items 37 through 39 are based on the following information pertaining to Arp Co.'s manufacturing operations:

<u>Inventories</u>	<u>3/1/89</u>	<u>3/31/89</u>
Direct materials	\$36,000	\$30,000
Work-in-process	18,000	12,000
Finished goods	54,000	72,000

Additional information for the month of March 1989:

Direct materials purchased	\$84,000
Direct labor payroll	60,000
Direct labor rate per hour	7.50
Factory overhead rate per direct labor hour	10.00

37. For the month of March 1989, prime cost was

- \$90,000
- \$120,000
- \$144,000
- \$150,000

38. For the month of March 1989, conversion cost was

- \$90,000
- \$140,000
- \$144,000
- \$170,000

39. For the month of March 1989, cost of goods manufactured was

- \$218,000
- \$224,000
- \$230,000
- \$236,000

40. Barkley Company adds materials at the beginning of the process in department M. Data concerning the materials used in March production are as follows:

	<u>Units</u>
Work-in-process at March 1	16,000
Started during March	34,000
Completed and transferred to next department during March	36,000
Normal spoilage incurred	4,000
Work-in-process at March 31	10,000

Using the weighted-average method, the equivalent units for the materials unit cost calculation are

- 30,000
- 34,000
- 40,000
- 46,000

41. Book Co. uses the activity-based costing approach for cost allocation and product costing purposes. Printing, cutting, and binding functions make up the manufacturing process. Machinery and equipment are arranged in operating cells that produce a complete product starting with raw materials. Which of the following are characteristics of Book's activity-based costing approach?

- Cost drivers are used as a basis for cost allocation.
 - Costs are accumulated by department or function for purposes of product costing.
 - Activities that do not add value to the product are identified and reduced to the extent possible.
- I only.
 - I and II.
 - I and III.
 - II and III.

42. The benefits of a just-in-time system for raw materials usually include
- Elimination of nonvalue adding operations.
 - Increase in the number of suppliers, thereby ensuring competitive bidding.
 - Maximization of the standard delivery quantity, thereby lessening the paperwork for each delivery.
 - Decrease in the number of deliveries required to maintain production.

43. Fab Co. manufactures textiles. Among Fab's 1991 manufacturing costs were the following salaries and wages:

Loom operators	\$120,000
Factory foremen	45,000
Machine mechanics	30,000

What was the amount of Fab's 1991 direct labor?

- \$195,000
- \$165,000
- \$150,000
- \$120,000

44. In a traditional job order cost system, the issue of indirect materials to a production department increases

- Stores control.
- Work in process control.
- Factory overhead control.
- Factory overhead applied.

45. Barnett Company adds materials at the beginning of the process in department M. Conversion costs were 75% complete as to the 8,000 units in work-in-process at May 1, and 50% complete as to the 6,000 units in work-in-process at May 31. During May 12,000 units were completed and transferred to the next department. An analysis of the costs relating to work-in-process at May 1 and to production activity for May is as follows:

	<u>Costs</u>	
	<u>Materials</u>	<u>Conversion</u>
Work-in-process, 5/1	\$ 9,600	\$ 4,800
Costs added in May	15,600	14,400

Using the weighted-average method, the total cost per equivalent unit for May was

- \$2.47
- \$2.50
- \$2.68
- \$3.16

46. Ral Co.'s target gross margin is 60% of the selling price of a product that costs \$5.00 per unit. The product's selling price per unit should be

- \$17.50
- \$12.50
- \$8.33
- \$7.50

47. Wages paid to factory machine operators of a manufacturing plant are an element of

	<u>Prime Cost</u>	<u>Conversion Cost</u>
a.	No	No
b.	No	Yes
c.	Yes	No
d.	Yes	Yes

48. Property taxes on a manufacturing plant are an element of

	<u>Conversion Cost</u>	<u>Period Cost</u>
a.	Yes	No
b.	Yes	Yes
c.	No	Yes
d.	No	No

49. In process 2, material G is added when a batch is 60 percent complete. Ending work-in-process units, which are 50 percent complete, would be included in the computation of equivalent units for

	<u>Conversion cost</u>	<u>Material G</u>
a.	Yes	No
b.	No	Yes
c.	No	No
d.	Yes	Yes

50. Assuming that there was no beginning work in process inventory, and the ending work in process inventory is 50% complete as to conversion costs, the number of equivalent units as to conversion costs would be

- The same as the units placed in process.
- The same as the units completed.
- Less than the units placed in process.
- Less than the units completed.

51. The fixed portion of the semivariable cost of electricity for a manufacturing plant is a

	<u>Conversion cost</u>	<u>Product cost</u>
a.	No	No
b.	No	Yes
c.	Yes	Yes
d.	Yes	No

52. A flexible budget is appropriate for a(an)

	<u>Administrative budget</u>	<u>Marketing budget</u>
a.	Yes	Yes
b.	Yes	No
c.	No	No
d.	No	Yes

53. Assuming that there was **no** beginning work in process inventory, and the ending work in process inventory is 100% complete as to material costs, the number of equivalent units as to material costs would be

- The same as the units placed in process.
- The same as the units completed.
- Less than the units placed in process.
- Less than the units completed.

54. Nonfinancial performance measures are important to engineering and operations managers in assessing the quality levels of their products. Which of the following indicators can be used to measure product quality?

- Returns and allowances.
 - Number and types of customer complaints.
 - Production cycle time.
- I and II only.
 - I and III only.
 - II and III only.
 - I, II, and III.

55. During March 1985 Bly Co.'s Department Y equivalent unit product costs, computed under the weighted-average method, were as follows:

Materials	\$1
Conversion	3
Transferred-in	5

Materials are introduced at the end of the process in Department Y. There were 4,000 units (40% complete as to conversion cost) in work-in-process at March 31, 1985. The total costs assigned to the March 31, 1985, work-in-process inventory should be

- \$36,000
- \$28,800
- \$27,200
- \$24,800

56. Birk Co. uses a job order cost system. The following debits (credit) appeared in Birk's work-in-process account for the month of April 1992:

<u>April</u>	<u>Description</u>	<u>Amount</u>
1	Balance	\$ 4,000
30	Direct materials	24,000
30	Direct labor	16,000
30	Factory overhead	12,800
30	To finished goods	(48,000)

Birk applies overhead to production at a predetermined rate of 80% of direct labor cost. Job No. 5, the only job still in process on April 30, 1992, has been charged with direct labor of \$2,000. What was the amount of direct materials charged to Job No. 5?

- \$3,000
- \$5,200
- \$8,800
- \$24,000

57. The flexible budget for a producing department may include

	<u>Direct labor</u>	<u>Factory overhead</u>
a.	No	Yes
b.	No	No
c.	Yes	No
d.	Yes	Yes

58. In a job order cost system, the use of indirect materials previously purchased usually is recorded as a decrease in

- a. Stores control.
- b. Work-in-process control.
- c. Factory overhead control.
- d. Factory overhead applied.

59. The following data were available from Mith Co.'s records on December 31, 1988:

Finished goods inventory, 1/1/88	\$120,000
Finished goods inventory, 12/31/88	110,000
Cost of goods manufactured	520,000
Lost on sale of plant equipment	50,000

The cost of goods sold for 1988 was

- a. \$510,000
- b. \$520,000
- c. \$530,000
- d. \$580,000

60. Boa Corp. distributes service department overhead costs directly to producing departments without allocation to the other service department. Information for the month of June 1985 is as follows:

	<u>Service Departments</u>	
	<u>Maintenance</u>	<u>Utilities</u>
Overhead costs incurred	<u>\$20,000</u>	<u>\$10,000</u>
Service provided to departments:		
Maintenance		10%
Utilities	20%	
Producing—A	40%	30%
Producing—B	<u>40%</u>	<u>60%</u>
Totals	<u>100%</u>	<u>100%</u>

The amount of maintenance department costs distributed to Producing—A department for June 1985 was

- a. \$8,000
- b. \$8,800
- c. \$10,000
- d. \$11,000

61. In manufacturing its products for the month of March 1989, Elk Co. incurred normal spoilage of \$5,000 and abnormal spoilage of \$9,000. How much spoilage cost should Elk charge as a period cost for the month of March 1989?

- a. \$0
- b. \$5,000
- c. \$9,000
- d. \$14,000

62. In developing a factory overhead application rate for use in a process costing system, which of the following could be used in the numerator?

- a. Actual direct labor hours.
- b. Estimated direct labor hours.
- c. Actual factory overhead costs.
- d. Estimated factory overhead costs.

63. In a process cost system, the application of factory overhead usually would be recorded as an increase in

- a. Cost of goods sold.
- b. Work in process control.
- c. Factory overhead control.
- d. Finished goods control.

64. Parat College allocates support department costs to its individual schools using the step method. Information for May 1995 is as follows:

	<u>Support departments</u>	
	<u>Maintenance</u>	<u>Power</u>
Costs incurred	<u>\$99,000</u>	<u>\$54,000</u>
Service percentages provided to:		
Maintenance	—	10%
Power	20%	—
School of Education	30%	20%
School of Technology	<u>50%</u>	<u>70%</u>
	<u>100%</u>	<u>100%</u>

What is the amount of May 1995 support department costs allocated to the School of Education?

- a. \$40,500
- b. \$42,120
- c. \$46,100
- d. \$49,125

65. Which of the following is a disadvantage of using a process costing system versus job order costing?
- a. It is difficult to determine cost of goods sold when partial shipments are made before completion.
 - b. It is difficult to ensure that material and labor are accurately charged to each specific job.
 - c. It involves the calculation of stage of completion of goods-in-process and the use of equivalent units.
 - d. It is expensive to use as a good deal of clerical work is required.

Chapter Eleven

Cost Accounting Problems

Actual Cost, Job Order and Process

NUMBER 1

In the course of your examination of the financial statements of the Zeus Company for the year ended December 31, 19X1, you have ascertained the following concerning its manufacturing operations:

Zeus has two production departments (fabricating and finishing) and a service department. In the fabricating department polyplast is prepared from miracle mix and bypro. In the finishing department each unit of polyplast is converted into six tetraplexes and three uniplexes. The service department provides services to both production departments.

The fabricating and finishing departments use process cost accounting systems. Actual production costs, including overhead, are allocated monthly.

Service department expenses are allocated to production departments as follows:

<u>Expense</u>	<u>Allocation Base</u>
Building maintenance	Space occupied
Timekeeping and personnel	Number of employees
Other	1/2 to fabricating, 1/2 to finishing

Raw materials inventory and work in process are priced on a FIFO basis.

The following data were taken from the fabricating department's records for December 19X1.

Quantities (units of polyplast):

In process, December 1	3,000
Started in process during month	<u>25,000</u>
Total units to be accounted for	<u>28,000</u>
Transferred to finishing department	19,000
In process, December 31	6,000
Lost in process	<u>3,000</u>
Total units accounted for	<u>28,000</u>
Cost of work in process, December 1:	
Materials	\$ 13,000
Labor	17,500
Overhead	<u>21,500</u>
	<u>\$ 52,000</u>
Direct labor costs, December	<u>\$154,000</u>
Departmental overhead, December	<u>\$132,000</u>

Polyplast work in process at the beginning and end of the month was partially completed as follows:

	<u>Materials</u>	<u>Labor and Overhead</u>
December 1	66 2/3%	50%
December 31	100 %	75%

The following data were taken from raw materials inventory records for December:

	<i>Miracle Mix</i>		<i>Bypro</i>	
	<u>Quantity</u>	<u>Amount</u>	<u>Quantity</u>	<u>Amount</u>
Balance, December 1	62,000	\$62,000	265,000	\$18,550
Purchases:				
December 12	39,500	49,375		
December 20	28,500	34,200		
Fabricating department usage	83,200		50,000	

Service department expenses for December (not included in departmental overhead above) were:

Building maintenance	\$ 45,000
Timekeeping and personnel	27,500
Other	<u>39,000</u>
	<u>\$111,500</u>

Other information for December 19X1 is presented below:

	<u>Square Feet of Space Occupied</u>	<u>Number of Employees</u>
Fabricating	75,000	180
Finishing	<u>37,500</u>	<u>120</u>
	<u>112,500</u>	<u>300</u>

Required:

- a. Compute the equivalent number of units of polyplast, with separate calculations for materials and conversion cost (direct labor plus overhead), manufactured during December.
- b. Compute the following items to be included in the fabricating department's production report for December 19X1, with separate calculations for materials, direct labor and overhead. Prepare supporting schedules.
 1. Total costs to be accounted for.
 2. Unit costs for equivalent units manufactured.
 3. Transfers to finishing department during December and work in process at December 31. Reconcile to your answer to part **b. 1.**

NUMBER 2

Stein Company is going to use a predetermined annual factory overhead rate to charge factory overhead to products. In conjunction with this, Stein Company must decide whether to use direct labor hours or machine hours as the overhead rate base.

Required:

Discuss the objectives and criteria that Stein Company should use in selecting the base for its predetermined annual factory overhead rate.

NUMBER 3

Presented below are four independent questions concerning a typical manufacturing company that uses a process-cost accounting system. Your response to each question should be complete, including simple examples or illustrations where appropriate.

Required:

- a. What is the rationale supporting the use of process costing instead of job-order costing for product-costing purposes? Explain.
- b. Define equivalent production (equivalent units produced). Explain the significance and use of equivalent production for product-costing purposes.
- c. Define normal spoilage and abnormal spoilage. Explain how normal-spoilage costs and abnormal-spoilage costs should be reported for management purposes.
- d. How does the first-in, first-out (FIFO) method of process costing differ from the weighted-average method of process costing? Explain.

NUMBER 4

Part a. The Rebecca Corporation is a manufacturer which produces special machines made to customer specifications. All production costs are accumulated by means of a job-order costing system. The following information is available at the beginning of the month of October.

Direct materials inventory, October 1	\$16,200
Work-in-process, October 1	3,600

A review of the job-order cost sheets revealed the composition of the work-in-process inventory on October 1, as follows:

Direct materials	\$1,320
Direct labor (300 hours)	1,500
Factory overhead applied	<u>780</u>
	<u>\$3,600</u>

Activity during the month of October was as follows:

- Direct materials costing \$20,000 were purchased.
- Direct labor for job orders totaled 3,300 hours at \$5 per hour.
- Factory overhead was applied to production at the rate of \$2.60 per direct labor hour.

On October 31, inventories consisted of the following components:

Direct materials inventory	<u>\$17,000</u>
Work-in-process inventory:	
Direct materials	\$4,320
Direct labor (500 hours)	2,500
Factory overhead applied	<u>1,300</u>
	<u>\$8,120</u>

Required:

Prepare in good form a detailed statement of the cost of goods manufactured for the month of October.

Part b. Lakeview Corporation is a manufacturer that uses the weighted-average process-cost method to account for costs of production. Lakeview manufactures a product that is produced in three separate departments: Molding, Assembling, and Finishing. The following information was obtained for the Assembling Department for the month of June.

Work-in-process, June 1—2,000 units composed of the following:

	<u>Amount</u>	<u>Degree of Completion</u>
Transferred in from the Molding Department	\$32,000	100%
Costs added by the Assembling Department:		
Direct materials	\$20,000	100%
Direct labor	7,200	60%
Factory overhead applied	<u>5,500</u>	50%
	<u>32,700</u>	
Work-in-process, June 1	<u>\$64,700</u>	

The following activity occurred during the month of June:

10,000 units were transferred in from the Molding Department at a cost of \$160,000.

150,000 of costs were added by the Assembling Department:

Direct materials	\$96,000
Direct labor	36,000
Factory overhead applied	<u>18,000</u>
	<u>\$150,000</u>

8,000 units were completed and transferred to the Finishing Department.

At June 30, 4,000 units were still in work-in-process. The degree of completion of work-in-process at June 30, was as follows:

Direct materials	90%
Direct labor	70%
Factory overhead applied	35%

Required:

Prepare in good form a cost of production report for the Assembling Department for the month of June. Show supporting computations in good form. The report should include:

- Equivalent units of production;
- Total manufacturing costs;
- Cost per equivalent unit;
- Dollar amount of ending work-in-process;
- Dollar amount of inventory cost transferred out.

NUMBER 5

Noble Manufacturing Company uses the weighted-average method of process costing when computing manufacturing cost per equivalent unit. The work in process inventory at the beginning of the period was complete as to materials, and one-third complete as to conversion costs. The work in process inventory at the end of the period was complete as to materials, and one-quarter complete as to conversion costs.

Required:

1. Describe how the cost of the beginning work in process inventory is handled using the weighted-average method of process costing when computing manufacturing cost per equivalent unit. Do not describe determination of equivalent units.
2. Identify the conditions under which the weighted-average method of process costing would be inappropriate.
3. Specify the advantages of the weighted-average method of process costing in contrast to the first-in, first-out method.
4. How would Noble compute the amount of the conversion cost portion of its ending work in process inventory using the weighted-average method?

Chapter Eleven

Solutions to Cost Accounting Questions

Actual Cost, Job Order and Process

1. (b)

	<u>Square Footage</u>	<u>Share of % of Total</u>	<u>Factory Maint. Costs</u>
Fabrication	88,000	55	\$111,760
Assembly	<u>72,000</u>	<u>45</u>	<u>91,440</u>
Total	<u>160,000</u>	<u>100</u>	<u>\$203,200</u>

Total factory maintenance costs = \$82,100 + \$65,000 + \$56,100 = \$203,200.

2. (c)

	<u>Direct Labor Hrs.</u>	<u>Share of Gen'l Factory % of Total</u>	<u>Administration Costs</u>
Fabrication	562,500	56.25	\$ 90,000
Assembly	<u>437,500</u>	<u>43.75</u>	<u>70,000</u>
Total	<u>1,000,000</u>	<u>100.00</u>	<u>\$160,000</u>

Total general-factory-administration costs = \$90,000 + \$70,000 = \$160,000.

3. (c) Factory cafeteria will be allocated first because it has the greatest total costs.

	<u>No. of Employees</u>	<u>% of Total</u>	<u>Share of Cafeteria costs</u>
Fabrication	280	56.0	\$134,400
Assembly	200	40.0	96,000
Gen.-Factory- Admin.	12	2.4	5,760
Factory Mtce.	<u>8</u>	<u>1.6</u>	<u>3,840</u>
Total	<u>500</u>	<u>100.0</u>	<u>\$240,000</u>

Total factory cafeteria costs = \$87,000 + \$91,000 + \$62,000 = \$240,000.

4. (a) Factory cafeteria costs were allocated before factory maintenance costs. Once a service department's costs have been allocated, no subsequent service-department costs are recirculated back to it (per #3 above).

5. (d) All of these nonfinancial measures would be useful in evaluating a manufacturing system.

Throughput time: Total production time required for a units production
measure of capacity and efficiency.

Setup time to total production time: Nonvalue-added function as a % of total production time
measure of efficiency.

Rework units as a % total units
measure of quality of production.

6. (a) Programmers for a computer programming company would be classified as direct labor which would be both a direct cost and a value-added cost of program development.

7. (a) The cost of normal spoilage is "absorbed" by the surviving units while abnormal spoilage is recognized immediately; that is, in the current period.

8. (d) Numerator: Estimated factory overhead; Denominator: Estimated machine hours.

$$\text{Predetermined overhead rate} = \frac{\text{Budget estimate of overhead cost}}{\text{Budget estimate of activity base}}$$

Only answer (d) has estimates for both overhead costs (the numerator) and an activity base (the denominator).

9. (b) Only direct manufacturing costs (direct materials and direct labor) should be traced to specific products. The other manufacturing costs, called indirect costs, should be allocated based upon activity cost drivers which only approximates the amount of cost incurred by the specific product.

10. (c) Direct labor is an element of both prime costs and conversion costs. Prime costs are direct material and direct labor. Conversion costs include direct labor and overhead costs.

11. (d) Activity based costing identifies the activities or transactions that cause costs to be incurred (cost drivers). Costs are accumulated (homogeneous cost pools) by activities and then assigned to products based upon the product's use of these activities in its production. Multiple cost drivers are usually employed in costing a single product as multiple activities are used in its production.

12. (b) Under the two variance method: The controllable (budget) variance is the difference between the actual overhead and the budgeted overhead. Both of these contain variable and fixed costs and either fixed or variable costs can vary from the budget.

The volume variance is due solely to fixed costs. It is the difference between the budgeted overhead and applied overhead based upon the same level of activity as the budget. Because the budget and applied activity bases are the same, budgeted variable overhead will equal applied variable overhead, and any volume variance is due solely to fixed costs.

Note: The answer is the same for both actual and standard costing. The difference between actual and standard, under the two variance method, is the activity base used for the budgeted overhead. Under actual costing, the activity base used would be the actual activity base achieved, while under standard costing, it would be the standard activity base for the production achieved.

13. (c) \$67,500

Computation of Equivalent Finished Units (Conversion Costs)

Units finished and transferred out	7,000
+ Normal spoilage -- finished	500
+ Ending inventory 2500 x 80%	<u>2,000</u>
E.F.U. -- at average	<u>9,500</u>

Conversion Cost Per E.F.U. (Wt. Aver.)

Beginning inventory conversion cost	\$10,000
Current period conversion cost	<u>75,500</u>
Total conversion cost	\$85,500
E.F.U. -- Conversion Cost	9,500
Conversion cost per E.F.U.	<u>\$ 9.00</u>

Conversion Costs transferred to Dept 2

Units finished and transferred out	7,000
Normal spoilage	<u>500</u>
	7,500
Conversion cost per unit	<u>x \$9</u>
	<u>\$67,500</u>

Note: Cost of spoiled units are assigned to units completed and transferred out; therefore, they are included in the E.F.U. computation.

14. (b) Activity based costing identifies the activities or transactions that cause costs to be incurred (cost drivers). Costs are then assigned to products based upon the product's use of these activities in its production. Multiple cost drivers are usually employed in costing a single product as multiple activities are used in its production.

15. (d) \$350,000 direct material purchases.

Direct materials used	\$300,000
Add: Increase in direct materials inventory	<u>50,000</u>
Purchases of direct materials	<u>\$350,000</u>

16. (b) Generally, an overtime premium is charged to overhead, and allocated to all jobs, as the arbitrary scheduling of jobs should not affect the cost of jobs worked on during overtime. However, if an overtime premium is due to a specific job or customer's requirements, it is appropriately charged to that job, increasing its costs.

17. (c) The cost of electricity for a manufacturing plant (fixed and variable) would be classified as overhead, which is an element of conversion costs (direct material and direct labor) and a product cost. A period cost is a noninventoriable cost which is deducted as an expense in the current period.

18. (b) Computation of CGS Using Manufacturing Costs

Raw Material Beginning Inventory	\$ 22,000	
Purchases	<u>300,000</u>	
	322,000	
Less: Ending Inventory	<u>30,000</u>	
Cost of Materials Used	<u>\$292,000</u>	
Work in Process Beginning Inventory	40,000	
Direct Material	292,000	
Direct Labor	120,000	
Overhead:		
Indirect Labor	60,000	
Taxes & Depr. on Factory	20,000	
Utilities chgd. to Factory		
60% 50,000	<u>30,000</u>	<u>110,000</u>
		562,000
Less: Ending Inv. of WIP	<u>48,000</u>	
Cost of Goods Manufactured	<u>\$514,000</u>	
Finished Goods Beg. Inv.	25,000	
Add: Cost of Goods Mfg.	<u>514,000</u>	
	539,000	
Less: Fin. Goods End. Inv.	<u>18,000</u>	
Cost of Goods Sold	<u>\$521,000</u>	

19. (c) Process-costing techniques should be used when the product is composed of mass-produced, homogeneous units. This does not preclude the use of standard costing (d). Answer (a) refers to job order costing.

20. (d) In the production process, storing raw materials until they are needed represents a non-value added step, whereas engineering, heat treatment or drilling represents improving the product. In addition, storage requires handling costs, cost of holding inventory, possible breakage or misappropriation, while inventory simply waits for use at a later time.

21. (c) Actual volume: Less than expected; Actual fixed cost: Greater than expected.

Overhead is applied to production with a predetermined overhead rate. The amount of overhead applied is equal to the predetermined rate times the actual or standard activity base for the volume of production achieved.

Underapplied overhead means that actual overhead costs were greater than the overhead applied to production (work-in-process). Therefore, either an increase in overhead costs or a decrease in the level of production (activity base) would result in underapplied overhead.

22. (b) This reflects the fact that the equivalent units include (1) those beginning inventory units that were completed, (2) the completed units all of whose costs were incurred in the current period, and (3) the partially completed units in ending inventory.

23. (d) The difference between FIFO and Weighted Average equivalent finished units (EFU) is the EFU of beginning inventory. Under the FIFO method, the EFU of beginning work-in-process inventory are excluded from the EFU computation for the period; however, under the Weighted Average method, these EFU are included in the EFU calculation.

For January, the EFU for Weighted Average and FIFO would be the same because there was no beginning inventory of work-in-process.

For February, the beginning inventory of work-in-process (January's ending inventory) would cause the Weighted Average EFU to be greater than the FIFO EFU for the month.

24. (d) 8,000 material; 4,800 conversion costs

Computation of equivalent units for material:

	<u>FIFO</u>	<u>W/A</u>	
Finished	36,000	36,000	
+ Ending WIP	(1) <u>6,000</u>	<u>6,000</u>	
	42,000	42,000	
- Beginning WIP	(1) <u>8,000</u>	<u>—</u>	
	34,000	42,000	+ 8,000

(1) Material added at the beginning of the process

Computation of equivalent units for conversion costs:

	<u>FIFO</u>	<u>W/A</u>	
Finished	36,000	36,000	
+ Ending WIP—6,000 80%	<u>4,800</u>	<u>4,800</u>	
	40,800	40,800	
- Beginning WIP—8,000 60%	<u>4,800</u>	<u>—</u>	
	36,000	40,800	+ 4,800

25. (a) \$39,600 and \$3,400

Completed goods 90,000	(\$.24 + \$.20) =	\$39,600
Goods in process		<u>3,400</u>
Total costs (\$24,000 + \$19,000) =		\$43,000

The above is all that is needed for the answer, because the total costs are \$43,000, the goods in process are \$3,400.

Computation of goods in process:

Material 10,000	.24 (100%) =	\$2,400
Conversion Cost 10,000	.20 (50%) =	<u>1,000</u>
		\$3,400

26. (c) 125,000; 105,000; 121,000.

B.I. WIP	25,000	
+ Transferred in	<u>100,000</u>	
Total units	125,000	(Also, E.U. – Transferred in))
– E.I. WIP	<u>20,000</u>	
Finished units	105,000	

Use finished units plus ending inventory of WIP to compute equivalent units.

	<u>M</u>	<u>C.C.</u>	<u>Transferred-in</u>
Finished	105,000	105,000	105,000
E.I. WIP 20,000 0%	—		
20,000 80%		16,000	
20,000 100%			<u>20,000</u>
	<u>105,000</u>	<u>121,000</u>	<u>125,000</u>

27. (c) EFU Computation:

Finished	100,000
EFU in ending inventory (60,000 50% complete)	30,000
Less: EFU in beginning inventory (25,000 80% complete)	<u>(20,000)</u>
	<u>110,000</u>

Unit cost computation:	Period Cost	EFU	=	Unit Cost
	143,000	110,000		<u>1.30</u>

Cost of ending WIP = \$1.30 30,000 EFU = \$39,000

Note ending inventory of 60,000 units = 25,000 B.I. + 135,000 started – 100,000 completed.

28. (d) Rework Cost:

Labor Cost (100 units \$2)	\$200
Overhead (\$200 D.L. 1.5)	<u>300</u>
	<u>\$500</u>

The cost of rework should be charged to the factory overhead control account, as the predetermined rate used to apply overhead (cost jobs) during the period includes an estimate for such costs.

29. (d) The cost of normal spoilage (\$60,000) is a product cost which should be absorbed by the good units produced and included in the recorded cost of both work-in-process and finished goods inventories.

The cost of abnormal spoilage (\$30,000) is a period cost and should be expensed in the current period.

30. (a) Direct material purchased	\$42,000
Add: Decrease in direct material inventory	<u>3,000</u>
Direct materials used	\$45,000
Direct labor	<u>30,000</u>
Total prime cost	<u>\$75,000</u>

31. (c) Direct labor	\$30,000
Overhead applied (\$10 4,000 hours)	<u>40,000</u>
Total conversion costs	<u>\$70,000</u>

Direct labor hours = \$30,000 direct labor costs divided by \$7.50 direct labor rate per hour = 4,000 hours.

32. (a)	Direct materials used	\$ 45,000
	Direct labor	30,000
	Overhead applied	<u>40,000</u>
	Manufacturing costs of the period	\$115,000
	Add: Decrease in work-in-process	<u>3,000</u>
	Cost of goods manufactured	<u>\$118,000</u>

33. (c)	Fixed maintenance cost per month (\$7,200 / 12)	\$ 600
	Variable cost (20,000 hrs. @ \$.60)	<u>12,000</u>
	Total maintenance cost budget for July	<u>\$12,600</u>

34. (d)		<u>Materials</u>	<u>Conversion</u>
	Finished Unit	2,100	2,100
	Ending Inventory		
	400 100%	400	
	400 25%		100
	Less: Beginning Inventory		
	500 100%	(500)	
	500 40%		<u>(200)</u>
	E.F.U. (FIFO)	<u>2,000</u>	<u>2,000</u>

35. (b)	Raw materials purchased	\$430,000
	Decrease in raw materials inventory	<u>15,000</u>
	Cost of raw materials used	\$445,000
	Direct labor	200,000
	Factory overhead	<u>300,000</u>
	Cost of goods manufactured	\$945,000 *
	Increase in finished goods inventory	<u>(35,000)</u>
	Cost of goods sold	<u>\$910,000</u>

Freight-out is a selling expense (period cost) and therefore does not enter into the computations.

*There was no change in the work in process inventory to be included in the cost of goods manufactured computation. Beginning and ending work-in-process inventory was "0".

36. (c)	Work-in-process March 1	\$ 2,000
	Add: Direct materials	12,000
	Direct labor	8,000
	Factory overhead	6,400
	Less: Transferred to finished goods	<u>(24,000)</u>
	Work-in-process March 31	\$ 4,400
	Less: Direct labor	(1,000)
	Factory overhead (\$1,000 @ 80%)	<u>(800)</u>
	Direct materials, Job #9	<u>\$ 2,600</u>

37. (d)	Direct material purchased	\$ 84,000
	Add: decrease in direct materials inventory	<u>6,000</u>
	Direct materials used	\$ 90,000
	Direct labor	<u>60,000</u>
	Total prime cost	<u>\$150,000</u>

38. (b)	Direct labor costs	\$ 60,000
	Overhead applied (\$10 @ 8,000 hrs)	<u>80,000</u>
	Total conversion costs	<u>\$140,000</u>
	Direct labor hours = \$60,000 / \$7.50 = 8,000	

39. (d)	Work in process 3/1/89	\$ 18,000
	Add: Direct materials (used)	90,000
	Direct labor	60,000
	Applied overhead	<u>80,000</u>
	Total production costs	\$248,000
	Less: Work in process 3/31/89	<u>(12,000)</u>
	Cost of goods manufactured	<u>\$236,000</u>
40. (d)	Finished units	36,000
	Ending inventory (10,000 100%)	<u>10,000</u>
	E.F.U. - Average	<u>46,000</u>

Note: Materials are added at the beginning of the process in dept. M; therefore, the units in the ending inventory are 100% complete as to materials.

Normal spoilage is a cost of good production (product cost); therefore, units of normal spoilage (or loss) are excluded from the E.F.U. computation.

41. (c) Activity based costing assigns costs to products based upon the product's use of activities (cost drivers) which caused the costs to be incurred. Costs are accumulated (homogeneous cost pools) by activities (cost drivers) rather than by department or function as in more traditional costing systems. Nonvalue-added activities (cost drivers), such as movement of product, storage, set up, and inspection are minimized or eliminated without adversely affecting the product or service.

42. (a) Just-in-time strongly advocates the elimination of non-value added operations. In contrast with answers (b), (c) and (d), JIT recommends reducing the number of suppliers (for higher quality and consistency); minimizing the standard delivery quantity (less goods on hand to store and move); and increasing the number of deliveries (again decreasing inventory, and other non-value added steps).

43. (d) A loom operator's salary or wages would be classified as direct labor, as the loom operator works directly on the manufacture of the product. The salary or wages of factory foremen and machine mechanics are indirect labor costs and appropriately classified as overhead.

44. (c) When indirect materials were initially purchased, they would be charged to the stores control. However, when they are issued to a production department, they would be charged (increased) to the factory overhead control account.

45. (c)	<u>E.F.U. Computation</u>	<u>Materials</u>	<u>Conversion</u>
	Finished units	12,000	12,000
	Ending inventory		
	6,000 units 100%	6,000	
	6,000 units 50%		<u>3,000</u>
	Wt. Avg. E.F.U.	<u>18,000</u>	<u>15,000</u>

Unit Cost Computation:

	<u>Beg. Inv. Cost</u>	+	<u>Period Cost</u>	=	<u>Total Cost</u>	<u>EFU</u>	=	<u>Unit Cost</u>
Materials	\$9,600		\$15,600		\$25,200	18,000	=	\$1.40
Conversion	\$4,800		\$14,400		\$19,200	15,000	=	<u>1.28</u>
Total Cost per E.F.U.								<u>\$2.68</u>

46. (b) If the gross profit of the product is 60%, then its cost must be 40% (1.00 less 60%). Since the dollar cost of the product is \$5.00 per unit, then that must equal 40% of the selling price. \$5.00 divided by 40% = \$12.50.

47. (d) Wages paid to factory machine operators are classified as direct labor. Direct labor is an element of prime costs (DM & DL) and an element of conversion costs (DL & OH).

48. (a) Property taxes on a manufacturing plant are classified as overhead which is an element of conversion costs (DL & OH). They would not be a period cost (which is an expense) as they are included as a product cost in overhead.

49. (a) Because Material G is added when a batch is 60% complete, the units in ending inventory, which are only 50% complete, would not have any Material G and would not be included in the computation of EFU for Material G. The ending inventory would be included in the computation of conversion costs (DL + overhead) EFU as they are 50% complete in process 2.

EFU computation:

Finished units	# units	
+ <u>Ending inventory EFU</u>	# units	% complete
	EFU average	
- <u>Beginning inventory EFU</u>	# units	% complete
	EFU FIFO	

50. (c) EFU Computations:

Finished units	#	
+ <u>Ending Inventory EFU</u>	#	50% complete
	EFU average	
- <u>Beginning Inventory EFU</u>	-0-	
	EFU FIFO	

As there is no beginning inventory, average EFU are equal to FIFO EFU and the answer to this question is the same for both methods.

As there is no beginning inventory, and ending inventory is 50% complete:

1. EFU is less than units placed in process (all units started have not been completed) -Answer (c).
2. EFU are less than units started; therefore answer (a) is incorrect.
3. EFU are greater than units completed; therefore answers (b) and (d) are incorrect.

51. (c) The cost of electricity for a manufacturing plant (fixed and variable) would be classified as overhead which is an element of conversion costs (DL & OH) and is a product cost.

Note: This cost would not be a period cost which is an expense.

52. (a) Flexible budgeting is a reporting system wherein the planned level of activity is adjusted to the actual level of activity before the budget to actual comparison report is prepared. It may be appropriately employed for any item which is affected by the level of activity (such as production, administration, and marketing).

53. (a) EFU Computations:

Finished units	#	
+ <u>Ending Inventory EFU</u>	#	100% complete
	EFU average	
- <u>Beginning Inventory EFU</u>	-0-	
	EFU FIFO	

As there is no beginning inventory, average EFU are equal to FIFO EFU and the answer to this question is the same for both methods.

As there is no beginning inventory and ending inventory is 100% complete:

1. EFU are equal to the units started (answer c) and therefore answer (c) is incorrect.
2. EFU are greater than units completed; therefore, answers (b) and (d) are incorrect.

54. (a) Product quality is best indicated by the returns and allowances made to customers, as well as their complaints about the product. The production cycle time refers only to the efficiency, not the quality.

55. (d)		<u>Units</u>	<u>% complete</u>	<u>Unit cost</u>	=	<u>Total cost</u>
	Materials	4,000	0%	\$1	=	\$ 0
	Conversion	4,000	40%	\$3	=	4,800
	Transferred in	4,000	100%	\$5	=	<u>20,000</u>
						<u>\$24,800</u>

56. (b) \$5,200—Direct materials, Job #5.

Work in process, April 1, 1992	\$ 4,000
Add: Direct materials	24,000
Direct labor	16,000
Factory overhead	12,800
Less: Transferred to finished goods	<u>(48,000)</u>
Work-in-process, April 30, 1992	\$ 8,800
Less: Direct labor	(2,000)
Overhead (\$2,000 80%)	<u>(1,600)</u>
Direct materials, Job #5	<u>\$ 5,200</u>

57. (d) Flexible budgeting is a reporting system wherein the planned level of activity is adjusted to the actual level of activity before the budget comparison report is prepared. It may appropriately be employed for any item which is affected by the level of activity (such as direct labor and overhead).

58. (a) When indirect materials are *purchased* they are charged to (increase) store supplies (an inventory account). When indirect materials are *used* they are charged to factory overhead control and credited against (decrease) store supplies.

59. (c)	Beginning inventory, finished goods	\$120,000
	Cost of goods manufactured	<u>520,000</u>
	Cost of goods available for sale	\$640,000
	Less ending inventory, finished goods	<u>(110,000)</u>
	Cost of goods sold	<u>\$530,000</u>

OR

Cost of goods manufactured	\$520,000
Add: Decrease in finished goods inventory (\$120,000 – \$110,000)	<u>10,000</u>
	<u>\$530,000</u>

60. (c)	<u>Producing</u>	<u>% Services</u>	<u>Allocation</u>	<u>Allocated</u>
	<u>Dept.</u>	<u>Provided</u>	<u>%</u>	<u>Maintenance Cost</u>
	A	40	50%	\$10,000
	B	<u>40</u>	50%	<u>10,000</u>
		80		<u>\$20,000</u>

As service department costs are allocated directly to producing departments, without allocation to other service departments, only the percentage of services provided to the producing departments A and B are relevant for the allocation.

61. (c) The cost of normal spoilage is a product cost which should be absorbed by the good units produced and included in the recorded cost of both work-in-process and finished goods inventories.

The cost of abnormal spoilage (\$9,000) is a period cost and should be expensed in the current period.

$$62. (d) \quad \text{Predetermined Rate} = \frac{\text{Budget estimate overhead cost}}{\text{Budget estimate activity base}}$$

63. (b) Applied factory overhead is charged (debited) to work-in-process and credited to the factory overhead control account. This increases work-in-process inventory and decreases the control account. Factory overhead is **not** applied directly to finished goods or cost of goods sold, but is included in the cost of the units transferred to these accounts.

64. (c) \$46,100

	<u>Maintenance</u>	<u>Power</u>	<u>Education</u>	<u>Technology</u>
Costs incurred (to allocate)	99,000	54,000		
Allocation of Maintenance Costs:				
Power 20% x 99,000	(19,800)	19,800		
Education 30% x 99,000	(29,700)		29,700	
Technology 50% x 99,000	<u>(49,500)</u>			49,500
	--0--	<u>73,800</u>		
Allocation of Power Costs:				
* Maintenance	--0--			
** Education 2/9 x 73,800		(16,400)	16,400	
Technology 7/9 x 73,800		<u>(57,400)</u>		<u>57,400</u>
		--0--	<u>46,100</u>	106,900

* Once a service department's cost is allocated, no reallocation to that department is made under the step method.

** Maintenance department service percentage (10%) is not used as its cost has already been allocated.

Service percentage:	Education	20
	Technology	<u>70</u>
	Total	90

Education percentage = 2/9.

Under the step method, generally the service department with the greatest inter-service department percentage or cost is allocated first.

65. (c) Process costing involves the use of equivalent units, and equivalent units depend on estimates of the stage of completion, which is not an exact science. For example, it is difficult for an auditor or an accountant to walk on the floor of a manufacturing plant at twelve midnight on December 31 and view 100 machines in various stages of production and say that on the average the stage of completion is X. Whereas, in a job order system, to build houses for example, the cost of direct materials and direct labor can be traced directly to the job (house) without any estimation.

Chapter Eleven

Solutions to Cost Accounting Problems

Actual Cost, Job Order and Process

NUMBER 1

a.

Zeus Company
SUMMARY OF EQUIVALENT UNITS OF POLYPLAST MANUFACTURED
For the Month of December 19X1

		<u>Materials</u>		<u>Labor and Overhead</u>	
	<u>Units</u>	<u>Per-</u> <u>centage</u>	<u>Equiv.</u> <u>Units</u>	<u>Per-</u> <u>centage</u>	<u>Equiv.</u> <u>Units</u>
Units completed:					
From beginning inventory	3,000	33 1/3%	1,000	50%	1,500
From current production (19,000 – 3,000)	16,000	100	16,000	100	16,000
Units in process, Dec. 31	6,000	100	<u>6,000</u>	75	<u>4,500</u>
			<u>23,000</u>		<u>22,000</u>

b. 1.

Zeus Company
Fabricating Department
TOTAL COSTS TO BE ACCOUNTED FOR
For the Month of December 19X1

In process, December 1	\$ 52,000
Added during month:	
Materials	92,000
Labor	154,000
Overhead	<u>198,000</u>
Total costs to be accounted for	<u>\$496,000</u>

Computation of Cost of Materials Added During December

	<u>Units</u>	<u>Unit</u> <u>Cost</u>	<u>Amount</u>
Miracle Mix:			
Beginning inventory	62,000	\$1.00	\$62,000
From December 12 purchase	<u>21,200</u>	1.25	<u>26,500</u>
	<u>83,200</u>		88,500
Bypro—from beginning inventory	<u>50,000</u>	.07	<u>3,500</u>
			<u>\$92,000</u>

Computation of Cost of Overhead Added During December

Fabricating department overhead		\$132,000
Allocation of service department overhead:		
Building maintenance		
(75,000 ÷ 112,500 × \$45,000)	\$30,000	
Timekeeping and personnel		
(180/300 × \$27,500)	16,500	
Other (1/2 × \$39,000)	<u>19,500</u>	<u>66,000</u>
		<u>\$198,000</u>

2.

Zeus Company
Fabricating Department
UNIT COSTS FOR EQUIVALENT UNITS MANUFACTURED
For the Month of December 19X1

Materials (\$92,000 ÷ 23,000)	\$ 4
Labor (\$154,000 ÷ 22,000)	7
Overhead (\$198,000 ÷ 22,000)	<u>9</u>
	<u>\$20</u>

3.

Zeus Company
Fabricating Department
TRANSFERS TO FINISHING DEPARTMENT AND ENDING WORK IN PROCESS
For the Month of December 19X1

Transfers to finishing department:		
Units started last month:		
Costs last month	\$52,000	
Materials (1,000 × \$4)	4,000	
Labor (1,500 × \$7)	10,500	
Overhead (1,500 × \$9)	<u>13,500</u>	\$ 80,000
Units started this month (16,000 × \$20)		<u>320,000</u>
		400,000
Work in process, December 31:		
Materials (6,000 × \$4)	24,000	
Labor (4,500 × \$7)	31,500	
Overhead (4,500 × \$9)	<u>40,500</u>	<u>96,000</u>
Total costs accounted for		<u>\$496,000</u>

NUMBER 2

An objective in selecting the base for Stein Company's predetermined annual factory overhead rate is to ensure the application of factory overhead in reasonable proportion to a beneficial or causal relationship to products. Ordinarily, the base selected should be closely related to functions represented by the applied overhead cost. If factory overhead costs are predominantly labor oriented, such as supervision and indirect labor, the proper base would probably be direct labor hours. If factory overhead costs are predominantly related to the costs incurred in the ownership and operation of the machinery, the proper base would probably be machine hours.

Another objective in selecting the base is to minimize clerical cost and effort relative to the benefits attained. When two or more bases provide approximately the same applied overhead cost to specific units of production, the simplest base should be used.

A predetermined annual factory overhead rate provides a feasible method of computing product costs promptly enough to serve management needs, such as identifying inefficiencies and minimizing month-to-month distortions in unit costs created by uneven expenditure patterns.

NUMBER 3

a. The type of cost system used by a company will be determined by the type of manufacturing operations performed. A manufacturing company should use a process cost system for product costing purposes when it continuously mass produces like units; while the production of custom-made or unique goods would indicate a job-order cost system to be more appropriate.

Because there is continuous mass production of like units in a process cost system, the center of attention is the individual process (usually a department). The unit costs by cost category as well as total unit cost for each process (department) are necessary for product costing purposes.

Process costing is often used in industries such as chemicals, food processing, oil, mining, rubber and electrical appliances.

b. "Equivalent production" (equivalent units produced) is the term used to identify the number of completed units that would have been produced if all the work performed during the period had been applied to units that were begun and finished during the period. Thus, equivalent production represents the total number of units that could have been started and finished during the period, given the same effort, assuming no beginning or ending work-in-process inventories.

The work of each producing department must be expressed in terms of a common denominator; this denominator represents the total work of a department or process in terms of fully completed units. Units in process of production at the beginning and end of the period should not be counted the same as units started and completed during the period when determining the equivalent amount of production for a period. Each partially completed unit has received only part of the attention and effort that a finished unit has received and, therefore, each partially completed unit should be weighted accordingly.

The equivalent production figure computed represents the number of equivalent whole units for which materials, labor, and overhead were issued, used, or incurred during a period. The cost of each element of materials, labor, and overhead is divided by the appropriate equivalent production figure to determine the unit cost for each element. Should units be at a different stage of completion with respect to each type of cost element, then a separate equivalent production figure must be computed for that cost element.

c. Normal spoilage is the spoilage that arises under normal efficient operating conditions; i.e., it is inherent in the production process and is uncontrollable in the short run. Abnormal spoilage is the spoilage that is not expected to arise under normal efficient operating conditions; i.e., it is not inherent in the production process and is usually considered as avoidable, or controllable, by management. Thus, by definition, the critical factor in distinguishing between normal and abnormal spoilage is the degree of controllability of units spoiled. Any spoilage that occurs during a production process functioning within the expected usual range of performance is considered to be normal spoilage. Any spoilage occurring in amounts in excess of the defined usual range is considered abnormal (controllable) spoilage.

Conceptually, the cost of normal spoilage should be included in the cost of good units produced because of its association with normal production. Likewise, cost of abnormal spoilage should be accounted for as a loss because

of its abnormal (unusual) nature. The cost of abnormal spoilage should be separately identified as a loss on reports for management.

For practical reasons, there may be no distinction made between normal and abnormal spoilage in reports for management. The primary reason for not distinguishing between types of spoilage is that it is sometimes very difficult (or impossible) to distinguish between normal and abnormal spoilage. The production process may be relatively new or the process may be altered often enough to make it impractical or too costly to distinguish between normal or abnormal spoilage. Whenever possible, though, the distinction between types of spoilage should be made and accounted for as discussed in the preceding paragraphs.

d. The primary difference between the FIFO method and the weighted-average method of process costing is in the treatment of the cost of the beginning work-in-process inventory. When applying the FIFO method the cost of the beginning work-in-process inventory is kept separate from the cost of production of the current period.

When determining the FIFO cost of units completed and transferred to the next department or to finished goods, the cost of the beginning work-in-process inventory plus the cost necessary to complete the beginning work-in-process units are added together. The sum of these two cost totals is the cost assigned to the units in the beginning work-in-process inventory that are transferred out. Units started and completed during the period are assigned costs on the basis of costs incurred during the period for the equivalent units produced during that period.

In applying the FIFO method, each department is regarded as a separate accounting unit. Thus, the application of the FIFO method in practice is modified to the extent that subsequent departments usually combine all transferred-in costs into one amount, even though they could identify and separately account for the costs relating to the preceding department's beginning inventory and the costs relating to the preceding department's units started and completed during the period.

The weighted-average method of process costing is simpler to apply than the FIFO method primarily because the beginning work-in-process inventory is considered to be part of current production. In applying the weighted-average method, the beginning work-in-process inventory costs are combined with current costs even though some of the production was begun prior to the current period. When equivalent units are determined, work done on the beginning inventory in a preceding period is regarded as if it were done in the current period.

The weighted-average method is applied by adding the beginning work-in-process inventory costs to the production costs incurred during the current period. Then unit costs are determined by dividing the sum of these costs by the equivalent units produced, including the units in the department's beginning work-in-process inventory. The cost of all units transferred out of a department (process) during the period is the product of the number of units completed multiplied by the average cost to produce a unit.

NUMBER 4

Part a.

The Rebecca Corporation
STATEMENT OF COSTS OF GOODS MANUFACTURED
For the Month Ended October 31

Materials inventory, October 1	\$16,200
Purchases	<u>20,000</u>
Materials available	36,200
Less: Materials inventory, October 31	<u>17,000</u>
Materials used in production	19,200
Direct labor (3,300 hrs. × \$5.00)	16,500
Factory overhead applied (3,300 hrs. × \$2.60)	<u>8,580</u>
Total current manufacturing costs	44,280
Work-in-process inventory, October 1	<u>3,600</u>
Total manufacturing costs	47,880
Less: Work-in-process inventory, October 31	<u>8,120</u>
Cost of goods manufactured	<u>\$39,760</u>

Part b.

Lakeview Corporation Assembling Department
COSTS OF PRODUCTION REPORT
For the Month Ended June 30

<u>Description</u>	<u>Total</u>	<u>Trans- ferred in</u>	<u>Direct Materials</u>	<u>Direct Labor</u>	<u>Factory Overhead</u>
Physical units to be accounted for					
Beginning inventory	2,000				
Transferred in	<u>10,000</u>				
Units to be accounted for	<u>12,000</u>				
Equivalent units of production					
Transferred out	8,000	8,000	8,000	8,000	8,000
Ending inventory*	<u>4,000</u>	<u>4,000</u>	<u>3,600</u>	<u>2,800</u>	<u>1,400</u>
Equivalent units	<u>12,000</u>	<u>12,000</u>	<u>11,600</u>	<u>10,800</u>	<u>9,400</u>

*4,000 * percentage of completion.

Manufacturing costs					
Beginning inventory	\$ 64,700	\$ 32,000	\$ 20,000	\$ 7,200	\$ 5,500
Current - June	<u>310,000</u>	<u>160,000</u>	<u>96,000</u>	<u>36,000</u>	<u>18,000</u>
Total manufacturing costs	<u>\$374,700</u>	<u>\$192,000</u>	<u>\$116,000</u>	<u>\$43,200</u>	<u>\$23,500</u>
Cost per equivalent unit*	<u>\$32.50</u>	<u>\$16.00</u>	<u>\$10.00</u>	<u>\$4.00</u>	<u>\$2.50</u>

*Total manufacturing cost % equivalent units.

Allocation of total costs					
Amount of ending work-in-process	\$114,700	\$ 64,000	\$ 36,000	\$11,200	\$ 3,500
Amount transferred out*	<u>260,000</u>	<u>128,000</u>	<u>80,000</u>	<u>32,000</u>	<u>20,000</u>
Total cost	<u>\$374,700</u>	<u>\$192,000</u>	<u>\$116,000</u>	<u>\$43,200</u>	<u>\$23,500</u>

*8,000 * equivalent unit cost.

NUMBER 5

1. The weighted-average method of process costing combines beginning work in process inventory costs with costs of the new period by adding the cost of the work in process inventory at the beginning of the period to the costs of the new period.
2. The weighted-average method of process costing would be inappropriate when beginning and ending inventories change radically from month to month and conversion costs per unit change radically from month to month.
3. The weighted-average method of process costing is generally easier to use than the first-in, first-out method primarily because the beginning work in process inventory is averaged in as part of current production. Furthermore, if several unit cost figures are used at the same time, extensive detail is required in the first-in, first-out method which can lead to complex procedures and even inaccuracy; and under such conditions the weighted-average method leads to more satisfactory cost computations.

The weighted-average method of process costing averages out uneven but expected cost incurrences over the entire period. This will reduce the fluctuations in unit costs and reflect operating experience for the period as a whole.

4. The units of the work in process inventory at the end of the period would be multiplied by one quarter (the portion complete as to conversion costs). The result would then be multiplied by the conversion cost per equivalent unit to arrive at the conversion cost portion of the ending work in process inventory.

Chapter Twelve

Cost Accounting: Joint Products and Standard Costs

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Chapter Twelve

Cost Accounting: Joint Products and Standard Costs

JOINT PRODUCTS

Joint products are two or more products of more than nominal value produced simultaneously in the same processing operation. Because the joint products are produced from the same operation, the cost of production must be allocated to the products on an estimated basis. The acceptable methods of allocation are:

1. The relative sales value method

Hilow and Hilee are produced simultaneously at a cost of \$54,000 in the extracting operation. 15,000 gallons of Hilow and 22,500 gallons of Hilee sell for 1.50 and 2.00 per gallon, respectively. Allocate the cost of production.

Sales value Hilow	$15,000 \times \$1.50 =$	\$22,500
Sales value Hilee	$22,500 \times \$2.00 =$	<u>45,000</u>
Total Sales Value		<u>\$67,500</u>
Cost of producing Hilow	$\frac{\$22,500}{\$67,500} \times \$54,000 =$	\$18,000
Cost of producing Hilee	$\frac{\$45,000}{\$67,500} \times \$54,000 =$	\$36,000

Use of this method produces the same percentage of gross profit.

2. Unit of measurement

Joint costs are allocated based on units, pounds, tons or gallons, etc. Applying unit of measurement to Hilow and Hilee would result in the following cost allocation:

Hilow—15,000	gallons
Hilee—22,500	gallons
Total	37,500
Hilow $\frac{15,000}{37,500} \times \$54,000 =$	\$21,600
Hilee $\frac{22,500}{37,500} \times \$54,000 =$	\$32,400

3. Assignment of weights

This method is quite arbitrary whereby consideration is given to such factors as volume, selling price, technical engineering and marketing processes.

4. Profit contribution method

Costs are allocated based on the profit margin or contribution remaining after deduction of all direct costs and expenses from the selling price.

Joint Costs—Processing After Split-Off

Frequently, joint products must pass through one or more processes after split-off with other joint products. The relative sales value may be unknown at point of split-off or because of the extensive additional processing required to make the product salable, may be difficult to determine. It is recommended that costs incurred after joint processing be applied as reductions in revenue on a dollar-for-dollar basis and the remaining revenue used as a basis for assignment of cost.

Case example: Products X and Y are produced in Department 1. Product X is further processed in Department 2 and Y is further processed in Department 3. Cost data for the three departments are:

<u>Department</u>	<u>X</u>	<u>Product</u>	<u>Y</u>	<u>Total Cost</u>
1	Joint		Joint	\$36,000
2	\$ 8,000			8,000
3			\$19,000	<u>19,000</u>
				<u>\$63,000</u>
Sales Value	\$36,000		\$54,000	

Solution: Adjustment of Sales Value

	<u>X</u>	<u>Y</u>
Sales Value	\$36,000	\$54,000
Less: Incremental Cost	<u>8,000</u>	<u>19,000</u>
Adjusted Relative Sales Value	\$28,000	\$35,000

$$\text{Assigned to X} \quad \frac{\$28,000}{\$28,000 + \$35,000} = \frac{28}{63} = 4/9$$

$$\text{Assigned to Y} \quad \frac{35}{63} = 5/9$$

Joint Dept. 1 costs assigned

X - 4/9 × \$36,000 =	\$16,000
Y - 5/9 × \$36,000 =	<u>20,000</u>
Total joint costs	\$36,000

By-Products

A by-product is an item of relatively small value produced incidental to the production or manufacture of one or more main products.

The recovery value of by-products may be treated as

1. Other income
2. Reduction of total production cost of the main product(s).
3. Replacement cost method—only applicable to those situations where the by-product is used within the plant eliminating the need to purchase materials from suppliers. Production costs of the main product are reduced accordingly.

Bilow, a by-product, is produced by the Extracting Department along with Hilow and Hilee. In March \$370 was received from Bilow sales. Journal Entries:

Method 1

Cash	\$370	
Other income		\$370

Method 2

Cash	\$370	
Work in Process, Extracting		\$370

Method 3, except that Bilow is used to replace material in the Foundry.

WIP, Foundry	\$370	
WIP, Extracting		\$370

STANDARD COSTS

Variance Analysis

Standard cost systems are used because it is relatively easy to assign uniform costs to the product and the use of standards gives management a yardstick by which performance can be evaluated. In most standard systems all charges to Work-in-Process are at standard. A typical cost card for one unit of product may be as follows:

<i>Cost Card-Standard</i>	
<i>One Unit of Product G</i>	
Material 4 lbs. @ \$1.50	\$ 6.00
Labor 2 hrs. @ \$4.00	8.00
Overhead \$2 per labor hour	<u>4.00</u>
Total	\$18.00

Other Information:

Actual Units Produced	9,000
Actual Materials Used	38,000 lbs.
Actual Material Cost	\$55,100
Actual Labor Used	18,500 hrs. @ \$4.10 per hr.
Actual Overhead	\$38,600

From this information we can compute material and labor variances.

Material		Variances	
<u>Units</u>	<u>Price</u>	<u>Debit</u>	<u>Credit</u>
Actual	× Actual		
38,000	× \$1.45	= \$55,100	
Price Variance			(38,000 × .05)
Actual	× Standard		
38,000	× \$1.50	= \$57,000	\$1,900
Quantity/Usage Variance			(2,000 × 1.50)
Standard	× Standard		
(9,000 × 4)			
36,000	× \$1.50	= \$54,000	<u>\$3,000</u>
Net Variance			\$1,100
Labor			
Hours	Rate		
Actual	× Actual		
18,500	× \$4.10	= \$75,850	
Rate/Wage Variance			(18,500 × .10)
Actual	× Standard		
18,500	× \$4	= \$74,000	\$1,850
Efficiency Variance			(500 × \$4)
Standard	× Standard		
18,000	× \$4	= \$72,000	<u>\$2,000</u>
Net Variance			\$3,850

Flexible Budgets

For analysis and control purposes, the Company set up a flexible budget for overhead (manufacturing expenses). This budget is used to determine the overhead rate (\$2 per labor hour) which is based on normal or expected capacity.

<u>Manufacturing Expenses</u>	<u>90%</u>	<u>95%</u>	<u>100%</u>	<u>105%</u>
Fixed	\$20,000	\$20,000	\$20,000	\$20,000
Variable	<u>18,000</u>	<u>19,000</u>	<u>20,000</u>	<u>21,000</u>
	38,000	39,000	40,000	41,000
Labor Hours	18,000	19,000	20,000	21,000
Overhead Rate			\$2	

This means that management has selected an activity level of 20,000 labor hours on which to base the standard overhead rate. If the company based the rate on **normal capacity**, a moving average of production for several years is probably being used. If the rate is based on **expected capacity**, the rate is based on the amount which the company **expects** to produce during the period, taking into consideration inventory levels at the beginning of the year, sales estimates, and planned inventory levels at year end.

Mixed Costs—Use of the High-Low Method

It may be necessary to determine whether a cost or group of costs contain both fixed and variable elements and if so, to what extent. There are many statistical methods used for this purpose such as the scattergraph method, least squares, but the simplest is the high and low points method.

This technique requires the use of two levels of cost and related activity. It is assumed that the change in cost from a lower level of activity to a higher level is variable. The variable cost change is translated into variable costs per unit of activity which can be used to compute the total variable cost at any level of activity and consequently the fixed cost. For example:

Machining costs for various parts show costs as follows:

<u>Activity Level</u>	<u>Costs</u>
3,000 Machine Hours	\$10,500
5,000 Machine Hours	13,500
Change in Activity	2,000
Change in Costs	\$3,000
Cost Per Machine Hour	$\frac{\$3,000}{2,000} = 1.50$ Variable Cost Per Machine Hour

Fixed cost computation:

$$3,000 \text{ level of activity} = \$10,500 - (3,000 \times 1.50) = \$6,000$$

$$5,000 \text{ level of activity} = \$13,500 - (5,000 \times 1.50) = \$6,000$$

Once the computation is made as above for the 3,000 machine hour level, it is not necessary to make the computation for the 5,000 hour or any other level because the result should be the same. The level used need not necessarily be the high and low points, but when using this method keep the following points in mind.

1. The costs used at the levels selected should represent normal conditions.
2. The levels selected should be within the "relevant range" of activity, i.e., the range of activity within which fixed costs are valid.
3. The computation assumes that variable costs are linear, i.e., changes in activity result in uniform changes in cost and graphically would represent a straight line.

Manufacturing Overhead Variances

Total Variance—Basic Computation

Actual Expenses	\$38,600
Standard $9,000 \times 2 \times 2$	<u>36,000</u>
Total Variance	<u>\$ 2,600</u> UNF

Regardless of what analysis of overhead is made, the resulting variances must equal the total variance of \$2,600.

Two-Variance Method—Controllable and Volume Variance (see Appendix A)

These overhead variances have been the most frequently required in recent CPA examination problems. All variances are simply the difference between **actual** and **standard** cost, which is called the net variance, divided into two or more variances to furnish management information. In the two-variance method, the controllable variance is a measure of the control of spending and efficient use of resources in that actual costs are compared with the budget at standard hours instead of actual hours. Hence, the term controllable refers to the fact that the two items measured by this variance, efficiency and spending, are controllable within the plant. The volume variance, which is caused by producing more or less than the level at which the overhead rate was computed (normal or expected capacity) is normally beyond the control of the plant and is sometimes referred to as the noncontrollable variance.

		<u>DR</u>	<u>CR</u>
Actual	\$38,600		
Budget at Standard Hours (\$20,000 + 18,000 × \$1)	38,000		
Standard $9,000 \times 2 \times 2$	36,000		
		\$600 Controllable UNF	*2,000 Volume UNF

*May also be referred to as capacity or non-controllable variance.

Three-Variance Method—Budget, Efficiency and Capacity Variance (see Appendix A)

The budget variance is computed at actual activity and for that reason is considered a measure of control of spending. To measure the spending effectiveness of **fixed** and variable elements individually, a breakdown of actual fixed and variable costs is needed, and converts the three variances into four variances. (See the four-variance method which follows.) Note also that a budget variance computed by using actual activity is a better measure of spending effectiveness since the activity base selected (labor hours, machine hours, etc.) is intended to be an indicator of changes in variable costs.

The efficiency variance is a function of either more or less than standard usage of the activity base. The capacity variance is attributable to the over- or under-application of **fixed** costs. For example:

An analysis of the capacity variance may be more clear by breaking down the overhead rate into the fixed and variable components.

	<u>Cost</u>	<u>Labor</u> <u>Hours</u>	<u>Rate</u>
Fixed	\$20,000	20,000	\$1.00
Variable	20,000	20,000	<u>1.00</u>
			\$2.00

Then compare the manufacturing overhead budget at standard with standard.

	<u>Hours</u>	<u>Standard Costs</u>	<u>Budget at Standard</u>	<u>Variance</u>
Fixed	$18,000 \times \$1 =$	\$18,000	\$20,000	\$2,000
Variable	$18,000 \times \$1 =$	18,000	18,000	<u>—0—</u>
Variance				\$2,000

We can see that the Fixed Costs cause the variance in that the failure to produce at or above the level on which the overhead rate is fixed will produce an unfavorable capacity variance.

		<u>DR</u>	<u>CR</u>
Actual	\$38,600		
		\$100 Budget UNF	
Budget based on actual hrs. \$20,000 + 18,500 × \$1	38,500		
		\$500 Efficiency UNF	
Budget based on standard hrs. \$20,000 + 18,000 × \$1	38,000		
		\$2,000 Capacity UNF	
Standard 9,000 × 2 × \$2	36,000		

Journal entries for the three variance method are as follows:

- | | | | |
|-----|---|----------|----------|
| (1) | Manufacturing expense control (actual) | \$38,600 | |
| | Indirect costs (material, labor, depreciation) | | \$38,600 |
| (2) | Work-in-process (standard) | \$36,000 | |
| | Overhead applied (an accumulation account) | | \$36,000 |
| | WIP is charged at standard at the end of the period. | | |
| (3) | Overhead applied | \$36,000 | |
| | Manufacturing expense control | | \$36,000 |
| | To close out overhead applied to manufacturing expense control. | | |
| (4) | Manufacturing expense control is closed to variance accounts. This entry shows unfavorable variances. | | |
| | Budget Variance | \$ 100 | |
| | Efficiency Variance | 500 | |
| | Capacity Variance | 2,000 | |
| | Manufacturing Expense Control | | \$2,600 |
| (5) | Inventories and cost of goods sold, cost of goods sold only or income summary | \$2,600 | |
| | Budget Variance | | \$ 100 |
| | Efficiency Variance | | 500 |
| | Capacity Variance | | 2,000 |

If the variances are allocated to the inventories and cost of goods sold, these accounts are converted to actual. If the variances are closed to cost of goods sold only, the inventory accounts are not converted to actual and the current period bears all the effects of such variances. If the variances are charged to expense (income summary), the current period likewise bears the effects of the variances, but with no effect on gross profit. If the variances are material, they should be allocated to all inventories and cost of goods sold.

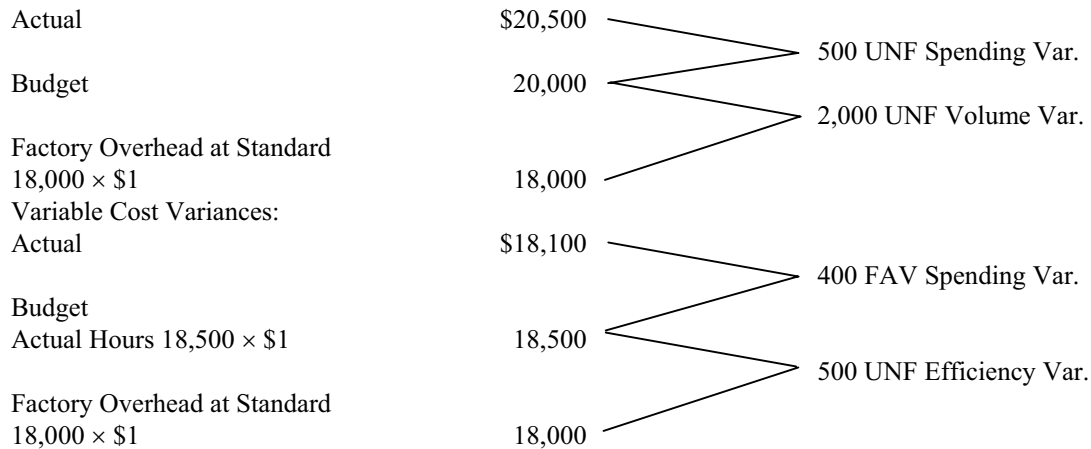
Four-Variance Method for Overhead (See Appendix A)

The four-variance method appeared in the CPA exam for the first time in November 1977. Even the three-variance method has appeared infrequently in the examination in recent years; therefore, it is unknown as to the extent the four-variance method will be tested in the future.

Assume the same facts used to compute the variances by the three-variance method and, in addition, the actual overhead of \$38,600 consists of \$20,500 of fixed costs and \$18,100 of variable costs.

Fixed Spending, Fixed Volume, Variable Spending and a Variable Efficiency Variance

Fixed Cost Variances:



The computation of these variances compares to the three-variance method as follows:

<u>Three-Variance</u>		<u>Four-Variance</u>	
Budget (Spending)	100 UNF	Fixed	500 UNF
Efficiency	500 UNF	Variable	400 FAV
Volume or Capacity	2,000 UNF	Same	
		Same	

The volume variance is the same in the two, three and four-variance methods. In the four-variance method the Budget Variance is divided into its fixed and variable elements, thus creating two spending variances, whereas the efficiency and volume variances are the same.

Favorable or Unfavorable Variances

In job order cost overhead was applied to product cost by means of a pre-determined rate. In standard cost systems all the elements of production cost are assigned to product based on a standard established before production begins. Even the most carefully established standards will differ from reality, and after all, the actual cost of the product must be controlling.

Since work-in-process, finished goods and cost of goods sold are assigned standard costs (and even raw materials in some cases) we might say that such accounts are on an estimated or tentative basis. When actual costs are determined, they are compared with standard. These comparisons result in variances. If we have applied to product costs an amount that is less than the actual cost, we must say that the particular cost element, material, labor or overhead is understated. Since these tentative costs flow through work-in-process to finished goods to cost of goods sold, an understatement of these accounts results in an additional debit or charge. We call this additional charge unfavorable since it results in an additional cost added to the product. For example:

Cost of Material — Actual	\$75,000
Standard Material Cost	<u>74,000</u>
Unfavorable Variance	\$ 1,000

Conversely, when costs at standard exceed actual, then product costs have been overstated and the resulting adjustment to actual is a credit and since costs are reduced by a credit, it is favorable. For example:

Cost of Labor — Actual	\$102,000
Standard Labor Cost	<u>105,000</u>
Favorable Variance	\$ 3,000

Disposition of Variances

Variances enter into the determination of periodic net income by:

- closing the variances to the income summary; in effect, the variances are treated as income or expense items.
- close the variance to cost of goods sold
- allocate the variances to the inventory accounts and cost of goods sold.

Inventories cannot properly be carried at standard unless such standard cost approximates actual costs. Therefore, where the variances are material only, (c) above is a viable option.

Another Method of Computing Material Price Variance

Because purchasing is a separate and distinct function from manufacturing, some companies compute the price variance on material at the time of purchase. This results in the Stores or Materials account being carried at standard cost and requires an additional computation to compute the usage variance.

Illustration:

Pertinent data for Product R

- Purchased—16,000 ft. of plastic @ \$1.20
- Requisitioned from stock—12,500 ft.
- Standard price—\$1.25 per foot
- Standard usage—5 ft. per unit
- Units produced—2,000—100% complete
- 500— 80% complete

Compute variances for material.

Solution:

		<u>Variance</u>
Actual Cost		
16,000 × \$1.20	\$19,200	
Price Variance		(16,000 × \$.05)
<u>16,000 × \$1.25</u>	20,000	800 FAV
Actual Usage at Standard Cost		
12,500 × \$1.25	15,625	
Usage Variance (2,400 × 5)		(500 × \$1.25)
12,000 × \$1.25	15,000	625 UNF

Journal entries:

Material (Stores)	\$20,000		
Price Variance		\$ 800	
Accounts Payable		19,200	
Work-in-Process	\$15,000		
Usage Variance	625		
Material		\$15,625	

Example: Convert the Materials and Work-in-Process Account to actual cost based on the above.

Allocation of Variances

Quantity Balances:

Material	3,500	× .05 = \$175	
Work-in-Process	<u>12,500</u>	× .05 = <u>625</u>	
Total Purchased	16,000		\$800 FAV

Material at Standard Price	3,500 × \$1.25	\$4,375
Less: Price Variance Adjustment		<u>175</u>
Actual Cost		\$4,200

Proof: 3,500 units at \$1.20 \$4,200

Work-in-Process at Standard	12,000 × \$1.25	\$15,000
Less: Price Variance Adjustment		(625)
Add: Usage Variance Adjustment		<u>625</u>
Actual Cost		\$15,000

Proof: 12,500 units at \$1.20 \$15,000

APPENDIX A

APPENDIX A OVERHEAD VARIANCE ANALYSIS

- Facts: (1) Actual Overhead—\$178,500 (\$112,500 Fixed; 66,000 Variable)
 (2) Budget—\$110,000 plus \$.50 per labor hour
 (3) Total Overhead Application Rate—\$1.50 per hour
 (4) Standard labor hours—115,000
 (5) Actual labor hours—121,000

	Actual Overhead \$178,500	Standard 115,000 × 1.50 \$172,500								
2-Variance Method (Controllable and Noncontrollable)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">CONTROLLABLE -</td> <td style="width: 50%; text-align: center;">NON-CONTROLLABLE OR VOLUME</td> </tr> <tr> <td style="text-align: center;">11,000 U</td> <td style="text-align: center;">5,000 F</td> </tr> <tr> <td style="text-align: center;">\$167,500 (A)</td> <td></td> </tr> </table>	CONTROLLABLE -	NON-CONTROLLABLE OR VOLUME	11,000 U	5,000 F	\$167,500 (A)				
CONTROLLABLE -	NON-CONTROLLABLE OR VOLUME									
11,000 U	5,000 F									
\$167,500 (A)										
3-Variance Method (Spending, Efficiency, Volume Variance)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">BUDGET (SPENDING) VAR.</td> <td style="width: 50%; text-align: center;">EFFICIENCY VAR.</td> </tr> <tr> <td style="text-align: center;">8,000 U</td> <td style="text-align: center;">3,000 U</td> </tr> <tr> <td style="text-align: center;">(\$110,000 + 121,000 × \$.50)</td> <td style="text-align: center;">\$170,500 (B)</td> </tr> <tr> <td></td> <td style="text-align: center;">\$167,500</td> </tr> </table>	BUDGET (SPENDING) VAR.	EFFICIENCY VAR.	8,000 U	3,000 U	(\$110,000 + 121,000 × \$.50)	\$170,500 (B)		\$167,500	\$172,500
BUDGET (SPENDING) VAR.	EFFICIENCY VAR.									
8,000 U	3,000 U									
(\$110,000 + 121,000 × \$.50)	\$170,500 (B)									
	\$167,500									
4-Variance Method (The spending variance is divided into a fixed and variable portion.)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">SPENDING VARIANCES</td> <td style="width: 50%; text-align: center;">VOLUME VARIANCE</td> </tr> <tr> <td style="text-align: center;">8,000 U</td> <td style="text-align: center;">5,000 F</td> </tr> <tr> <td style="text-align: center;">\$170,500</td> <td></td> </tr> </table>	SPENDING VARIANCES	VOLUME VARIANCE	8,000 U	5,000 F	\$170,500		\$172,500		
SPENDING VARIANCES	VOLUME VARIANCE									
8,000 U	5,000 F									
\$170,500										

SAME AS ABOVE

FIXED ACTUAL	\$112,500	
FIXED STD.	110,000	2,500 U
VAR. ACTUAL	66,000	
VAR. STD.	60,500	5,500 U
TOTAL SPENDING VAR.	\$8,000 U	

APPENDIX B

COST AND MANAGERIAL ACCOUNTING TERMS

ABNORMAL SPOILAGE: Spoilage that does not normally occur in a particular production process.

ABSORPTION COSTING: Both fixed and variable costs are assigned to product. Opposed to direct costing in which only variable costs are assigned to product and fixed costs are period costs.

ACCOUNTING METHOD: A Capital Budgeting term. Another name for the unadjusted rate of return method. Also called Book Value Method. The increase in future average annual net income from a project divided by the investment.

BUDGET: A financial plan for future activity.

BUDGET VARIANCE: The difference between actual and budgeted costs. As to overhead, comparison is made at actual production level.

BY-PRODUCTS: One or more products of relatively small value which are obtained during production of the main product.

CAPITAL BUDGETING: Financial evaluation procedure for proposed or planned capital outlays.

CASH BUDGET: A budget on a cash basis to determine projected cash position.

CASH FLOW: The excess of cash received over cash disbursed (or vice versa) over a period.

CONTRIBUTION MARGIN: Selling price less variable costs.

CONTROLLABLE COST: A cost which can be controlled at some level of management.

CONVERSION COST: Direct labor plus factory overhead.

COST CENTER: A unit of production or service activity for which costs are accumulated.

DIFFERENTIAL COST: Also called incremental or relevant cost. Two or more alternatives are compared by determining the change in costs under each alternative.

DIRECT COSTING: Fixed overhead becomes a period cost and is excluded as a cost element of inventory. See Absorption Costing.

EFFICIENCY VARIANCE: A variance applied to both direct labor and overhead. As to labor, the variance measures the difference between actual and standard labor hours times the standard overhead rate. As to overhead, the variance measures the difference between the actual usage of the activity base (e.g., labor hours or machine hours) and the standard usage times the variable overhead rate.

EQUIVALENT FINISHED UNITS: The number of units complete in terms of whole units. For example, 1500 units $\frac{2}{3}$ complete are 1000 units in equivalents.

EXPECTED ANNUAL ACTIVITY: The activity which management anticipates for the year. Expected activity may not always be used to determine the overhead rate. See Normal Activity.

EXPECTED VALUE: In probability, the value of a particular act times its probability.

EXPIRED COST: A cost that becomes an expense of the current period because of the lack of future utility.

FACTORY OVERHEAD: Factory costs other than Direct Material and Direct Labor. Also called manufacturing expense, indirect expense, or burden.

FIXED COST: A cost which remains constant over a given period of activity. See Relevant Range.

FLEXIBLE BUDGET: A budget prepared for more than one level of production.

IDEAL CAPACITY: Absolute maximum production with no allowances for work stoppages. Also called Theoretical Capacity.

IMPUTED COST: Costs not computed under conventional accounting methods and are not expenditures, but involve a foregone opportunity. Similar to Opportunity Cost.

INCREMENTAL COST: Two or more alternatives are evaluated by considering only the change in cost factors. Same as Differential Costs.

INDIRECT LABOR: Labor costs not traceable to specific units of output.

INVENTORIAL COST: Costs assigned to units for inventory purposes.

JOB ORDER COSTING: Cost system in which costs of production are assigned to specific jobs or lots.

JOINT COST: A cost applicable to more than one cost center or activity.

JOINT PRODUCT COSTS: Costs applicable to two or more products produced by a single process. Up to the point of split-off costs must be assigned on an estimated basis. See Relative Sales Value Method.

MANAGEMENT BY EXCEPTION: Concentrates on deviations from expected results.

MARGINAL COSTING: See Direct Costing.

MARGINAL INCOME: See Contribution Margin.

MIXED COST: A cost which contains both fixed and variable elements.

NET PRESENT VALUE METHOD: In Capital Budgeting, a project is evaluated by computing the net present value of expected cash flows based on a predetermined rate of return. If the result exceeds the investment, the project meets the basic investment criteria. An index can be constructed:

$$\frac{\text{Net Present Value}}{\text{Investment}}$$

NORMAL ACTIVITY: Production expected in a given year based on an average over a period of years which includes seasonal, cyclical and trend factors. An overhead rate based on normal activity may result in sizeable under- and overapplications of overhead over a period of years.

$$\begin{aligned} \text{Budgeted Overhead} &= \text{Overhead Rate based} \\ \text{Average production for} & \text{on normal activity} \\ \text{the past 5 years.} & \\ \text{Budgeted Overhead} &= \text{Overhead rate based} \\ \text{Management's estimate} & \text{on expected activity} \\ \text{of production for the year} & \end{aligned}$$

Also see Practical Capacity.

NORMAL SPOILAGE: Anticipated spoilage under efficient operations.

OPERATIONS RESEARCH: Various mathematical and statistical models used in decision making.

OPPORTUNITY COST: Income that could have been derived from a resource had it been applied to an alternate use. For example, warehouse space used to store inventory has an opportunity cost equal to the rental value.

OUT-OF-POCKET COSTS: Current costs or outlays related to a particular activity.

OVERAPPLIED OVERHEAD: The excess of overhead cost applied to product over costs actually incurred. Can be broken down to a Budget and Capacity Variance in Job Order Cost.

PAYBACK: Period in which cash flow equals the investment in a project. Does not measure profitability.

PAYBACK RECIPROCAL: Method of approximating the true rate of return. Can be used only when the life of the project is twice the payback period and inflows are uniform.

$$\begin{aligned} \text{Investment} & \quad \$100,000 \\ \text{Payback} & \quad 30,000 \text{ per year for 10 years} \\ \\ \text{Payback} & \quad \frac{\$300,000}{100,000} = 3/1 \end{aligned}$$

Reciprocal 1/3 or 33 1/3% approximate true rate of return.

PAYOFF TABLE: Used to evaluate various alternatives under different probabilities of occurrence to determine the alternative which maximizes profits.

PERFORMANCE REPORT: Comparison of actual with budget.

PERIOD COST: A cost associated with a particular period which cannot be carried forward to the succeeding period as an asset. See Expired Cost.

PERT: A formal diagram of the timing relationships of a complex series of planned activities.

PRACTICAL CAPACITY: Maximum level of production that a plant or department can operate efficiently. Ideal capacity less allowance for unavoidable stoppages.

PRICE VARIANCE: A Direct Material Variance. The difference between the units acquired at actual and at standard. The price variance can also be computed based on the difference between the units used in production at actual and standard.

PRIME COST: Direct Material and Direct Labor.

PROCESS COSTING: A costing system in which unit costs are computed within a time frame, usually a month, by dividing the units produced into the costs during the period. Used with FIFO or Average. Used in production of similar type product over extended periods.

PRO-FORMA STATEMENTS: Forecasted statements or statements prepared to show what would result "as if" certain events had taken place.

QUANTITY VARIANCE: The difference between the actual quantity used and the standard allowed multiplied by the standard price. Also called the Usage Variance.

RATE VARIANCE: A Direct Labor Variance, similar to the Price Variance for Direct Material. The difference between the actual and standard wage rate multiplied by actual amount of Direct Labor used.

REALLOCATION: Allocation of service department costs to the various producing departments based on some criteria of allocation related to benefits derived.

RELATIVE SALES VALUE METHOD: Assignment of joint product costs based on the relative sales value of each joint product. Results in the same gross profit percentage for all joint products.

RELEVANT RANGE: A range of activity within which cost data is valid, particularly fixed costs. Takes recognition of the fact that if production increases or decreases enough, fixed costs will change.

SALES MIX: The combination of quantities of products that make up total sales. Also, combination of items and various gross profit percentages that make up total contribution.

SERVICE DEPARTMENTS: Departments that render specialized assistance to the producing departments. Costs must be ultimately borne by the producing departments.

SPENDING VARIANCE: An overhead price variance comparing actual variable overhead with budgeted variable overhead.

SPLIT-OFF POINT: Separation point for joint products.

STANDARD COST: Predetermined cost that should be attained.

STANDARD HOURS ALLOWED: Units produced times standard hours.

STEP VARIABLE COSTS: Describe the effect of variable costs which change abruptly, thereby appearing on a graph as steps.

SUNK COST: A cost which has been incurred and has no effect on contemplated action.

TIME ADJUSTED RATE OF RETURN: A capital budgeting term. The rate of interest at which the present value of future cash flows from a project is equal to the present value of the investment.

TRANSFER PRICE: Exchange price by segments of the same organization when goods or resources are transferred. Example, manufactured goods shipped to retail outlets of the same company.

UNADJUSTED RATE OF RETURN: The ratio of the future average annual net income to the initial investment. Also called the accounting method and the book value method.

UNDERAPPLIED OVERHEAD: Excess of overhead cost incurred over the amount of overhead cost applied.

UNEXPIRED COST: A cost which may be properly carried forward to future periods as an asset.

USAGE VARIANCE: See Quantity Variance.

VARIABLE COST: A cost which is constant per unit, but changes in total in proportion to changes in production activity.

VARIANCE: Difference between actual from expected or budgeted results.

WORK-IN-PROCESS INVENTORY: Cost of incomplete goods still in production stage.

Chapter Twelve

Cost Accounting Questions

Joint Products and Standard Costs

JOINT AND BY-PRODUCTS

1. Each of the following is a method by which to allocate joint costs **except**
- Relative sales value.
 - Relative profitability.
 - Relative weight, volume, or linear measure.
 - Average unit cost.

Items 2 and 3 are based on the following information:

Forward, Inc., manufactures products P, Q, and R from a joint process. Additional information is as follows:

	<i>P</i>	<i>Product Q</i>	<i>R</i>	<i>Total</i>
Units produced	4,000	2,000	1,000	7,000
Joint cost	\$36,000	?	?	\$60,000
Sales value at split-off	?	?	\$15,000	\$100,000
Additional costs if processed further	\$ 7,000	\$ 5,000	\$ 3,000	\$ 15,000
Sales value if processed further	\$70,000	\$30,000	\$20,000	\$120,000

2. Assuming that joint costs are allocated using the relative-sales-value-at-split-off approach, what were the joint costs allocated to products Q and R?
- \$12,000 for Q and \$12,000 for R.
 - \$14,400 for Q and \$9,600 for R.
 - \$15,000 for Q and \$9,000 for R.
 - \$16,000 for Q and \$8,000 for R.
3. Assuming that joint costs are allocated using the relative-sales-value-at-split-off approach, what was the sales value at split-off for product P?
- \$58,333.
 - \$59,500.
 - \$60,000.
 - \$63,000.

4. Helen Corp. manufactures products W, X, Y, and Z from a joint process. Additional information is as follows:

<i>Product</i>	<i>Units Produced</i>	<i>Sales</i>	<i>If Processed Further</i>	
		<i>Value at Split-off</i>	<i>Additional Costs</i>	<i>Sales Value</i>
W	6,000	\$ 80,000	\$ 7,500	\$ 90,000
X	5,000	60,000	6,000	70,000
Y	4,000	40,000	4,000	50,000
Z	3,000	20,000	2,500	30,000
	<u>18,000</u>	<u>\$200,000</u>	<u>\$20,000</u>	<u>\$240,000</u>

Assuming that total joint costs of \$160,000 were allocated using the relative-sales-value at split-off approach, what were the joint costs allocated to each product?

	<i>W</i>	<i>X</i>	<i>Y</i>	<i>Z</i>
a.	\$40,000	\$40,000	\$40,000	\$40,000
b.	\$53,333	\$44,444	\$35,556	\$26,667
c.	\$60,000	\$46,667	\$33,333	\$20,000
d.	\$64,000	\$48,000	\$32,000	\$16,000

5. A processing department produces joint products Ajac and Bjac, each of which incurs separable production costs after split-off. Information concerning a batch produced at a \$60,000 joint cost before split-off follows:

<i>Product</i>	<i>Separable costs</i>	<i>Sales value</i>
Ajac	\$ 8,000	\$ 80,000
Bjac	<u>22,000</u>	<u>40,000</u>
Total	<u>\$30,000</u>	<u>\$120,000</u>

What is the joint cost assigned to Ajac if costs are assigned using the relative net realizable value?

- \$16,000
- \$40,000
- \$48,000
- \$52,000

6. Kode Co. manufactures a major product that gives rise to a by-product called May. May's only separable cost is a \$1 selling cost when a unit is sold for \$4. Kode accounts for May's sales by deducting the \$3 net amount from the cost of goods sold of the major product. There are no inventories. If Kode were to change its method of accounting for May from a by-product to a joint product, what would be the effect on Kode's overall gross margin?

- No effect.
- Gross margin increases by \$1 for each unit of May sold.
- Gross margin increases by \$3 for each unit of May sold.
- Gross margin increases by \$4 for each unit of May sold.

7. The method of accounting for joint-product costs that will produce the same gross-profit rate for all products is the

- Relative sales-value method.
- Physical-measure method.
- Actual-costing method.
- Services-received method.

8. Ohio Corporation manufactures liquid chemicals A and B from a joint process. Joint costs are allocated on the basis of relative-sales-value at split-off. It costs \$4,560 to process 500 gallons of product A and 1,000 gallons of product B to the split-off point. The sales value at split-off is \$10 per gallon for product A and \$14 for product B. Product B requires an additional process beyond split-off at a cost of \$1 per gallon before it can be sold. What is Ohio's cost to produce 1,000 gallons of product B?

- \$3,360.
- \$3,660.
- \$4,040.
- \$4,360.

9. Superior Company manufactures products A and B from a joint process which also yields a by-product, X. Superior accounts for the revenues from its by-product sales as a deduction from the cost of goods sold of its main products. Additional information is as follows:

	<u>Products</u>			<u>Total</u>
	<u>A</u>	<u>B</u>	<u>X</u>	
Units produced	15,000	9,000	6,000	30,000
Joint costs	?	?	?	\$264,000
Sales value at split-off	\$290,000	\$150,000	\$10,000	\$450,000

Assuming that joint product costs are allocated using the relative-sales-value at split-off approach, what was the joint cost allocated to product B?

- \$79,200.
- \$88,000.
- \$90,000.
- \$99,000.

10. Which of the following statements **best** describes a by-product?

- A product that is produced from material that would otherwise be scrap.
- A product that has a lower unit selling price than the main product.
- A product created along with the main product whose sales value does **not** cover its cost of production.
- A product that usually produces a small amount of revenue when compared to the main product revenue.

11. At the split-off point, products may be salable or may require further processing in order to be salable. Which of the following have both of these characteristics?

	<u>By-products</u>	<u>Joint products</u>
a.	No	No
b.	No	Yes
c.	Yes	No
d.	Yes	Yes

12. Which of the following is (are) acceptable regarding the allocation of joint product cost to a by-product?

	<u>None allocated</u>	<u>Some portion allocated</u>
a.	Acceptable	Not acceptable
b.	Acceptable	Acceptable
c.	Not acceptable	Acceptable
d.	Not acceptable	Not acceptable

Items 13 and 14 are based on the following information:

Warfield Corporation manufactures products C, D and E from a joint process. Joint costs are allocated on the basis of relative-sales-value at split-off. Additional information is as follows:

	<u>Product</u>			<u>Total</u>
	<u>C</u>	<u>D</u>	<u>E</u>	
Units produced	6,000	4,000	2,000	12,000
Joint costs	\$ 72,000	?	?	\$120,000
Sales value at split-off	?	?	\$30,000	\$200,000
Additional costs if processed further	\$ 14,000	\$10,000	\$ 6,000	\$ 30,000
Sales value if processed further	\$140,000	\$60,000	\$40,000	\$240,000

13. How much of the joint costs should Warfield allocate to product D?

- \$24,000
- \$28,800
- \$30,000
- \$32,000

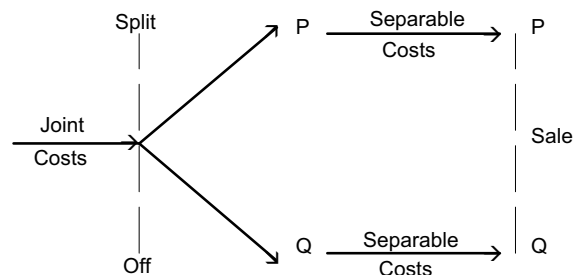
14. Assuming that the 2,000 units of product E were processed further and sold for \$40,000, what was Warfield's gross profit on the sale?

- \$ 4,000
- \$14,000
- \$16,000
- \$22,000

15. For purposes of allocating joint costs to joint products, the sales price at point of sale, reduced by cost to complete after split-off, is assumed to be equal to the

- Joint costs.
- Total costs.
- Net sales value at split-off.
- Sales price less a normal profit margin at point of sale.

16. The diagram below represents the production and sales relationships of joint products P and Q. Joint costs are incurred until split-off, then separable costs are incurred in refining each product. Market values of P and Q at split-off are used to allocate joint costs.



If the market value of P at split-off increases and all other costs and selling prices remain unchanged, then the gross margin of

	<u>P</u>	<u>Q</u>
a.	Increases	Decreases
b.	Increases	Increases
c.	Decreases	Decreases
d.	Decreases	Increases

17. The following information pertains to a byproduct called Moy:

Sales in 1991	5,000 units
Selling price per unit	\$6
Selling costs per unit	2
Processing costs	0

Inventory of Moy was recorded at net realizable value when produced in 1990. No units of Moy were produced in 1991. What amount should be recognized as profit on Moy's 1991 sales?

- \$0
- \$10,000
- \$20,000
- \$30,000

18. Actual sales values at split-off point for joint products Y and Z are not known. For purposes of allocating joint costs to products Y and Z, the relative sales value at split-off method is used. An increase in the costs beyond split-off occurs for product Z, while those of product Y remain constant. If the selling prices of finished products Y and Z remain constant, the percentage of the total joint costs allocated to Product Y and Product Z would

- Decrease for Product Y and increase for Product Z.
- Decrease for Product Y and Product Z.
- Increase for Product Y and decrease for Product Z.
- Increase for Product Y and Product Z.

STANDARD COST AND VARIANCES

19. Which of the following is one of the purposes of standard costs?

- To simplify costing procedures and expedite cost reports.
- To replace budgets and budgeting.
- To use them as a basis for product costing for external-reporting purposes.
- To eliminate having to account for underapplied or overapplied factory overhead at the end of the period.

20. When a manager is concerned with monitoring total cost, total revenue, and net profit conditioned upon the level of productivity, an accountant would normally recommend

	<u>Flexible budgeting</u>	<u>Standard costing</u>
a.	Yes	Yes
b.	Yes	No
c.	No	Yes
d.	No	No

21. Which of the following standard costing variances would be **least** controllable by a production supervisor?

- Overhead volume.
- Overhead efficiency.
- Labor efficiency.
- Material usage.

22. If a company follows a practice of isolating variances at the earliest point in time, what would be the appropriate time to isolate and recognize a direct material price variance?

- When material is issued.
- When material is purchased.
- When material is used in production.
- When purchase order is originated.

23. How should a usage variance that is significant in amount be treated at the end of an accounting period?

- Reported as a deferred charge or credit.
- Allocated among work-in-process inventory, finished goods inventory, and cost of goods sold.
- Charged or credited to cost of goods manufactured.
- Allocated among cost of goods manufactured, finished goods inventory, and cost of goods sold.

24. What is the normal year-end treatment of immaterial variances recognized in a cost accounting system utilizing standards?

- Reclassified to deferred charges until all related production is sold.
- Allocated among cost of goods manufactured and ending work-in-process inventory.
- Closed to cost of goods sold in the period in which they arose.
- Capitalized as a cost of ending finished goods inventory.

25. Palo Corp. manufactures one product with a standard direct labor cost of 2 hours at \$6.00 per hour. During March, 500 units were produced using 1,050 hours at \$6.10 per hour. The unfavorable direct labor efficiency variance is

- \$100
- \$105
- \$300
- \$305

26. A standard cost system may be used in

- Neither process costing nor job order costing.
- Process costing but **not** job order costing.
- Either job order costing or process costing.
- Job order costing but **not** process costing.

Items 27 through 31 are based on the following information:

Tolbert Manufacturing Company uses a standard-cost system in accounting for the cost of production of its only product, product A. The standards for the production of one unit of product A are as follows:

- Direct materials: 10 feet of item 1 at \$.75 per foot and 3 feet of item 2 at \$1.00 per foot.
- Direct labor: 4 hours at \$3.50 per hour.
- Manufacturing overhead: applied at 150% of standard-direct-labor costs.

There was no inventory on hand at July 1, 19X2. Following is a summary of costs and related data for the production of product A during the year ended June 30, 19X3.

- 100,000 feet of item 1 were purchased at \$.78 per foot.
- 30,000 feet of item 2 were purchased at \$.90 per foot.
- 8,000 units of product A were produced which required 78,000 feet of item 1, 26,000 feet of item 2, and 31,000 hours of direct labor at \$3.60 per hour.
- 6,000 units of product A were sold.

At June 30, 19X3, there are 22,000 feet of item 1, 4,000 feet of item 2, and 2,000 completed units of product A on hand. All purchases and transfers are "charged in" at standard.

27. For the year ended June 30, 19X3, the total debits to the raw-materials account for the purchase of item 1 would be
- \$75,000.
 - \$78,000.
 - \$58,500.
 - \$60,000.

28. For the year ended June 30, 19X3, the total debits to the work-in-process account for direct labor would be
- \$111,600.
 - \$108,500.
 - \$112,000.
 - \$115,100.

29. Before allocation of standard variances, the balance in the material-usage-variance account for item 2 was
- \$1,000 credit.
 - \$2,600 debit.
 - \$600 debit.
 - \$2,000 debit.

30. If all standard variances are prorated to inventories and cost of goods sold, the amount of material-usage variance for item 2 to be prorated to raw-materials inventory would be
- \$0.
 - \$333 credit.
 - \$333 debit.
 - \$500 debit.

31. If all standard variances are prorated to inventories and cost of goods sold, the amount of material-price variance for item 1 to be prorated to raw-materials inventory would be
- \$0.
 - \$647 debit.
 - \$600 debit.
 - \$660 debit.

32. In connection with a standard cost system being developed by Flint Co., the following information is being considered with regard to standard hours allowed for output of one unit of product:

	<u>Hours</u>
Average historical performance for the past three years	1.85
Production level to satisfy average consumer demand over a seasonal time span	1.60
Engineering estimates based on attainable performance	1.50
Engineering estimates based on ideal performance	1.25

To measure controllable production inefficiencies, what is the best basis for Flint to use in establishing standard hours allowed?

- 1.25
- 1.50
- 1.60
- 1.85

33. Which of the following is the most probable reason a company would experience an unfavorable labor rate variance and a favorable labor efficiency variance?

- The mix of workers assigned to the particular job was heavily weighted towards the use of higher paid experienced individuals.
- The mix of workers assigned to the particular job was heavily weighted towards the use of new relatively low paid unskilled workers.
- Because of the production schedule workers from other production areas were assigned to assist this particular process.
- Defective materials caused more labor to be used in order to produce a standard unit.

34. The following were among Gage Co.'s 1991 costs:

Normal spoilage	\$ 5,000
Freight out	10,000
Excess of actual manufacturing costs over standard costs	20,000
Standard manufacturing costs	100,000
Actual prime manufacturing costs	80,000

Gage's 1991 actual manufacturing overhead was

- \$40,000
- \$45,000
- \$55,000
- \$120,000

35. What does a credit balance in a direct-labor efficiency variance account indicate?

- The average wage rate paid to direct labor employees was less than the standard rate.
- The standard hours allowed for the units produced were greater than actual direct-labor hours used.
- Actual total direct-labor costs incurred were less than standard direct-labor costs allowed for the units produced.
- The number of units produced was less than the number of units budgeted for the period.

36. Information on Material Company's direct-material costs is as follows:

Actual units of direct materials used	20,000
Actual direct-material costs	\$40,000
Standard price per unit of direct materials	\$2.10
Direct-material efficiency variance-favorable	\$ 3,000

What was Material's direct-material price variance?

- a. \$1,000 favorable.
- b. \$1,000 unfavorable.
- c. \$2,000 favorable.
- d. \$2,000 unfavorable.

37. What type of direct material variances for price and usage will arise if the actual number of pounds of materials used exceeds standard pounds allowed but actual cost was less than standard cost?

	<u>Usage</u>	<u>Price</u>
a.	Unfavorable	Favorable
b.	Favorable	Favorable
c.	Favorable	Unfavorable
d.	Unfavorable	Unfavorable

38. Information on Kennedy Company's direct-material costs is as follows:

Standard unit price	\$3.60
Actual quantity purchased	1,600
Standard quantity allowed for actual production	1,450
Materials purchase price variance-favorable	\$240

What was the actual purchase price per unit, rounded to the nearest penny?

- a. \$3.06.
- b. \$3.11.
- c. \$3.45.
- d. \$3.75.

39. Lab Corp. uses a standard cost system. Direct labor information for Product CER for the month of October is as follows:

Standard rate	\$6.00 per hour
Actual rate paid	\$6.10 per hour
Standard hours allowed for actual production	1,500 hours
Labor efficiency variance	\$600 unfavorable

What are the actual hours worked?

- a. 1,400.
- b. 1,402.
- c. 1,598.
- d. 1,600.

40. Air, Inc., uses a standard cost system. Overhead cost information for Product CO for the month of October is as follows:

Total actual overhead incurred	\$12,600
Fixed overhead budgeted	\$ 3,300
Total standard overhead rate per direct labor hour	\$4.00
Variable overhead rate per direct labor hour	\$3.00
Standard hours allowed for actual production	3,500

What is the overall (or net) overhead variance?

- a. \$1,200 favorable.
- b. \$1,200 unfavorable.
- c. \$1,400 favorable.
- d. \$1,400 unfavorable.

Items 41 and 42 are based on the following information:

Data on Goodman Company's direct-labor costs is given below:

Standard direct-labor hours	30,000
Actual direct-labor hours	29,000
Direct-labor usage (efficiency) variance--favorable	\$4,000
Direct-labor rate variance--favorable	\$5,800
Total payroll	\$110,200

41. What was Goodman's actual direct-labor rate?

- a. \$3.60.
- b. \$3.80.
- c. \$4.00.
- d. \$5.80.

42. What was Goodman's standard direct-labor rate?

- a. \$3.54.
- b. \$3.80.
- c. \$4.00.
- d. \$5.80.

43. During 1990, a department's three-variance overhead standard costing system reported unfavorable spending and volume variances. The activity level selected for allocating overhead to the product was based on 80% of practical capacity. If 100% of practical capacity had been selected instead, how would the reported unfavorable spending and volume variances be affected?

	<u>Spending variance</u>	<u>Volume variance</u>
a.	Increased	Unchanged
b.	Increased	Increased
c.	Unchanged	Increased
d.	Unchanged	Unchanged

44. If over- or underapplied overhead is interpreted as an error in allocating actual costs against the production of the year, this suggests that the over- or underapplied overhead of this year should be

- Carried forward in the overhead control account from year to year.
- Eliminated by changing the predetermined overhead rate in subsequent years.
- Apportioned among the work-in-process inventory, the finished goods inventory, and the cost of goods sold.
- Treated as a special gain or loss occurring during the year.

45. Yola Co. manufactures one product with a standard direct labor cost of four hours at \$12.00 per hour. During June, 1,000 units were produced using 4,100 hours at \$12.20 per hour. The unfavorable direct labor efficiency variance was

- \$1,220
- \$1,200
- \$820
- \$400

46. Under the two-variance method for analyzing factory overhead, the factory overhead applied to production is used in the computation of the

	<u>Controllable (budget) variance</u>	<u>Volume variance</u>
a.	Yes	No
b.	Yes	Yes
c.	No	Yes
d.	No	No

47. Carr Co. had an unfavorable materials usage variance of \$900. What amounts of this variance should be charged to each department?

	<u>Purchasing</u>	<u>Warehousing</u>	<u>Manufacturing</u>
a.	\$0	\$0	\$900
b.	\$0	\$900	\$0
c.	\$300	\$300	\$300
d.	\$900	\$0	\$0

48. The variable factory overhead rate under the normal-volume, practical-capacity, and expected activity levels would be the

- Same except for normal volume.
- Same except for practical capacity.
- Same except for expected activity.
- Same for all three activity levels.

49. Lanta Restaurant compares monthly operating results with a static budget. When actual sales are less than budget, would Lanta usually report favorable variances on variable food costs and fixed supervisory salaries?

	<u>Variable food costs</u>	<u>Fixed supervisory salaries</u>
a.	Yes	Yes
b.	Yes	No
c.	No	Yes
d.	No	No

Items 50 and 51 are based on the following information:

The following information relates to a given department of Herman Company for the fourth quarter 19X4:

Actual total overhead (fixed plus variable)	\$178,500
Budget formula	\$110,000 plus \$0.50 per hr.
Total overhead application rate	\$1.50 per hr.
Spending variance	\$8,000 unfavorable
Volume variance	\$5,000 favorable

The total overhead variance is divided into three variances—spending, efficiency, and volume.

50. What were the actual hours worked in this department during the quarter?
- 110,000.
 - 121,000.
 - 137,000.
 - 153,000.
51. What were the standard hours allowed for good output in this department during the quarter?
- 105,000.
 - 106,667.
 - 110,000.
 - 115,000.

Items 52 and 53 are based on the following information:

Beth Company's budgeted fixed factory overhead costs are \$50,000 per month plus a variable factory overhead rate of \$4 per direct labor hour. The standard direct labor hours allowed for October production were 18,000. An analysis of the factory overhead indicates that, in October, Beth had an unfavorable budget (controllable) variance of \$1,000 and a favorable volume variance of \$500. Beth uses a two-way analysis of overhead variances.

52. The actual factory overhead incurred in October is
- \$121,000.
 - \$122,000.
 - \$122,500.
 - \$123,000.
53. The applied factory overhead in October is
- \$121,000.
 - \$122,000.
 - \$122,500.
 - \$123,000.

54. The following information is available from the Tyro Company:

Actual factory overhead	\$15,000
Fixed overhead expenses, actual	\$ 7,200
Fixed overhead expenses, budgeted	\$ 7,000
Actual hours	3,500
Standard hours	3,800
Variable overhead rate per direct labor hour	\$2.50

- Assuming that Tyro uses a three-way analysis of overhead variances, what is the spending variance?
- \$750 favorable.
 - \$750 unfavorable.
 - \$950 favorable.
 - \$1,500 unfavorable.

55. Information on Fire Company's overhead costs is as follows:

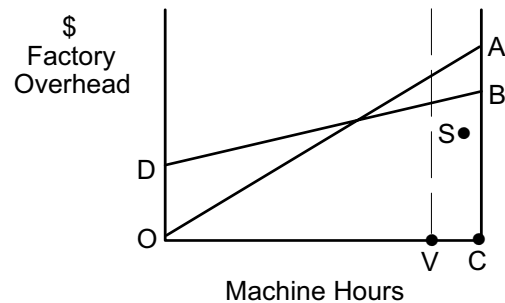
Actual variable overhead	\$73,000
Actual fixed overhead	\$17,000
Standard hours allowed for actual production	32,000
Standard variable overhead rate per direct-labor hour	\$2.50
Standard fixed overhead rate per direct-labor hour	\$0.50

What is the total overhead variance?

- \$1,000 unfavorable.
- \$6,000 favorable.
- \$6,000 unfavorable.
- \$7,000 favorable.

Items 56 and 57 are based on the following:

The diagram below depicts a factory overhead flexible budget line DB and standard overhead application line OA. Activity is expressed in machine hours with Point V indicating the standard hours required for the actual output in September 1990. Point S indicates the actual machine hours (inputs) and actual costs in September 1990.



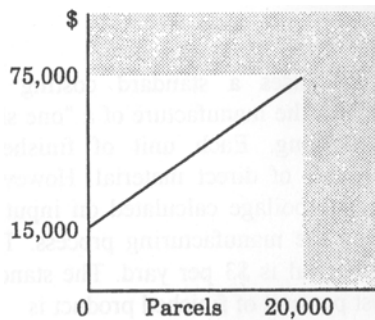
56. Are the following overhead variances favorable or unfavorable?

	<i>Volume (capacity) variance</i>	<i>Efficiency variance</i>
a.	Favorable	Favorable
b.	Favorable	Unfavorable
c.	Unfavorable	Favorable
d.	Unfavorable	Unfavorable

57. The budgeted total variable overhead cost for C machine hours is
- AB
 - BC
 - AC minus DO
 - BC minus DO

58. The standard direct material cost to produce a unit of Lem is 4 meters of material at \$2.50 per meter. During May 1995, 4,200 meters of material costing \$10,080 were purchased and used to produce 1,000 units of Lem. What was the material price variance for May 1995?
- \$400 favorable.
 - \$420 favorable.
 - \$80 unfavorable.
 - \$480 unfavorable.

59. Sender, Inc. estimates parcel mailing costs using data shown on the chart below.



What is Sender's estimated cost for mailing 12,000 parcels?

- \$36,000
- \$45,000
- \$51,000
- \$60,000

60. The following direct labor information pertains to the manufacture of product Glu:

Time required to make one unit	2 direct labor hours
Number of direct workers	50
Number of productive hours per week, per worker	40
Weekly wages per worker	\$500
Workers' benefits treated as direct labor costs	20% of wages

What is the standard direct labor cost per unit of product Glu?

- \$30
- \$24
- \$15
- \$12

61. Under the two-variance method for analyzing factory overhead, the actual factory overhead is used in the computation of the

	<u>Controllable (budget) variance</u>	<u>Volume variance</u>
a.	Yes	Yes
b.	Yes	No
c.	No	No
d.	No	Yes

62. Which of the following variances would be useful in calling attention to a possible short-term problem in the control of overhead costs?

	<u>Spending variance</u>	<u>Volume variance</u>
a.	No	No
b.	No	Yes
c.	Yes	No
d.	Yes	Yes

63. The following information pertains to Roe Co.'s 1991 manufacturing operations:

Standard direct labor hours per unit	2
Actual direct labor hours	10,500
Number of units produced	5,000
Standard variable overhead per standard direct labor hour	\$3
Actual variable overhead	\$28,000

Roe's 1991 unfavorable variance overhead efficiency variance was

- \$0
- \$1,500
- \$2,000
- \$3,500

64. Information on Cox Company's direct-material costs for the month of January was as follows:

Actual quantity purchased	18,000
Actual unit purchase price	\$ 3.60
Materials purchase price variance--unfavorable (based on purchases)	\$ 3,600
Standard quantity allowed for actual production	16,000
Actual quantity used	15,000

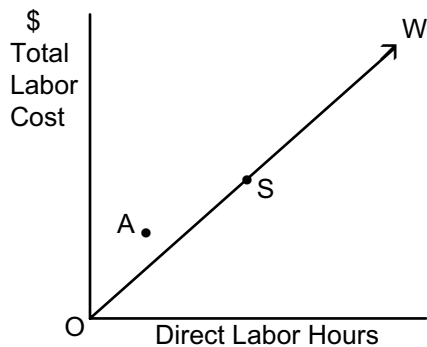
For January there was a favorable direct-material usage variance of

- \$3,360
- \$3,375
- \$3,400
- \$3,800

65. Companies in what type of industry may use a standard cost system for cost control?

	<i>Mass production industry</i>	<i>Service industry</i>
a.	Yes	Yes
b.	Yes	No
c.	No	No
d.	No	Yes

66. On the diagram below, the line OW represents the standard labor cost at any output volume expressed in direct labor hours. Point S indicates the actual output at standard cost, and Point A indicates the actual hours and actual cost required to produce S.



Which of the following variances are favorable or unfavorable?

	<i>Rate variance</i>	<i>Efficiency variance</i>
a.	Favorable	Unfavorable
b.	Favorable	Favorable
c.	Unfavorable	Unfavorable
d.	Unfavorable	Favorable

67. Under the three-variance method for analyzing factory overhead, which of the following is used in the computation of the spending variance?

	<i>Budget allowance based on actual hours</i>	<i>Budget allowance based on standard hours</i>
a.	Yes	No
b.	Yes	Yes
c.	No	Yes
d.	No	No

68. Under the two-variance method for analyzing factory overhead, the budget allowance based on standard hours allowed is used in the computation of the

	<i>Controllable (budget) variance</i>	<i>Volume variance</i>
a.	Yes	Yes
b.	Yes	No
c.	No	No
d.	No	Yes

69. Dahl Co. uses a standard costing system in connection with the manufacture of a "one size fits all" article of clothing. Each unit of finished product contains 2 yards of direct material. However, a 20% direct material spoilage calculated on input quantities occurs during the manufacturing process. The cost of the direct material is \$3 per yard. The standard direct material cost per unit of finished product is

- a. \$4.80
- b. \$6.00
- c. \$7.20
- d. \$7.50

Items 70 and 71 are based on the following data:

The following information pertains to Nell Company's production of one unit of its manufactured product during the month of June:

Standard quantity of materials	5 lbs.
Standard cost per lb.	\$.20
Standard direct labor hours	.4
Standard wage rate per hour	\$7.00
Materials purchased	100,000 lbs.
Cost of materials purchased	\$.17 per lb.
Materials consumed for manu- facture of 10,000 units	60,000 lbs.
Actual direct labor hours required for 10,000 units	3,900
Actual direct labor cost per hour	\$7.20

The materials price variance is recognized when materials are purchased.

70. Nell's materials price variance for June was

- a. \$3,000 favorable.
- b. \$3,000 unfavorable.
- c. \$2,000 favorable.
- d. \$2,000 unfavorable.

71. Nell's labor efficiency variance for June was
- \$780 favorable.
 - \$780 unfavorable.
 - \$700 favorable.
 - \$700 unfavorable.
-

72. The following relationships pertain to a year's budgeted activity for the Smythe Company:

Direct-labor hours	300,000	400,000
Total costs	\$129,000	\$154,000

What are the budgeted fixed costs for the year?

- \$25,000
 - \$54,000
 - \$75,000
 - \$100,000
-

Items 73 and 74 are based on the following information:

Maintenance expenses of a company are to be analyzed for purposes of constructing a flexible budget. Examination of past records disclosed the following costs and volume measures:

	<u>Highest</u>	<u>Lowest</u>
Cost per month	\$39,200	\$32,000
Machine hours	24,000	15,000

73. Using the high-low-point method of analysis, the estimated variable cost per machine hour is

- \$1.25
- \$12.50
- \$0.80
- \$0.08

74. Using the high-low technique, the estimated annual fixed cost for maintenance expenditures is

- \$447,360
 - \$240,000
 - \$230,400
 - \$384,000
-

75. Under the two-variance method for analyzing overhead, which of the following variances consists of both variable and fixed overhead elements?

	<u>Controllable (budget)</u> <u>variance</u>	<u>Volume variance</u>
a.	Yes	Yes
b.	Yes	No
c.	No	No
d.	No	Yes

Chapter Twelve

Cost Accounting Problems

Joint Products and Standard Costs

NUMBER 1

An important part of managerial accounting is the analysis of the types of costs that a business entity can incur. These types of costs are generally classified as variable, fixed, and semivariable.

Required:

- a. Define and discuss the identifying characteristics of a
 1. Variable cost.
 2. Fixed cost.
- b. With respect to a semivariable cost
 1. Define and discuss the identifying characteristics of a semivariable cost.
 2. Discuss the three basic methods employed to "break down" a semivariable cost into its component parts.

NUMBER 2

Webb & Company is engaged in the preparation of income tax returns for individuals. Webb uses the weighted average method and actual costs for financial reporting purposes. However, for internal reporting, Webb uses a standard cost system. The standards, based on equivalent performance, have been established as follows:

Labor per return	5 hrs. @ \$20 per hr.
Overhead per return	5 hrs. @ \$10 per hr.

For March performance, budgeted overhead is \$49,000 for the standard labor hours allowed. The following additional information pertains to the month of March:

Inventory data

Returns in process, March 1 (25% complete)	200
Returns started in March	825
Returns in process, March 31 (80% complete)	125

Actual cost data

Returns in process March 1:	
Labor	\$ 6,000
Overhead	2,500
Labor, March 1 to 31	
4,000 hours	89,000
Overhead, March 1 to 31	45,000

Required:

- a. Using the weighted average method, compute the following for each cost element:
 - (1) Equivalent units of performance.
 - (2) Actual cost per equivalent unit.
- b. Compute the actual cost of returns in process at March 31.
- c. Compute the standard cost per return.
- d. Prepare a schedule for internal reporting analyzing March performance, using the following variances, and indicating whether these variances are favorable or unfavorable:
 - (1) Total labor.
 - (2) Labor rate.
 - (3) Labor efficiency.
 - (4) Total overhead.
 - (5) Overhead volume.
 - (6) Overhead budget.

NUMBER 3

Armando Corporation manufactures a product with the following standard costs:

Direct materials—20 yards @ \$1.35 per yard	\$27
Direct labor—4 hours @ \$9.00 per hour	36
Factory overhead—applied at five-sixths of direct labor.	
Ratio of variable costs to fixed costs: 2 to 1	<u>30</u>
Total standard cost per unit of output	<u>\$93</u>

Standards are based on normal monthly production involving 2,400 direct labor hours (600 units of output).

The following information pertains to the month of July:

Direct materials purchased—18,000 yards @ \$1.38 per yard	\$24,840
Direct materials used—9,500 yards	
Direct labor—2,100 hours @ \$9.15 per hour	19,215
Actual factory overhead	16,650

500 units of the product were actually produced in July.

Required:

- a. Prepare the following schedules computing:
 1. Variable factory overhead rate per direct labor hour.
 2. Total fixed factory overhead based on normal activity.
- b. Prepare the following schedules for the month of July, indicating whether each variance is favorable or unfavorable:
 1. Materials price variance (based on purchases).
 2. Materials usage variance.
 3. Labor rate variance.
 4. Labor efficiency variance.
 5. Controllable factory overhead variance.
 6. Capacity (volume) factory overhead variance.

NUMBER 4

Meyer Company's cost accounting department has prepared a factory overhead variance analysis report using the two-variance method. The plant manager of Meyer Company is interested in understanding the managerial usefulness of this report.

Required:

1. What are the purposes of a factory overhead variance analysis report?
2. Identify and explain the underlying assumptions associated with the two-variance method. Discuss the significance of each variance.

NUMBER 5

Lond Co. produces joint products Jana and Reta, together with byproduct Bynd. Jana is sold at split-off, whereas Reta and Bynd undergo additional processing. Production data pertaining to these products for the year ended December 31, 1989, were as follows:

	<u>Jana</u>	<u>Reta</u>	<u>Bynd</u>	<u>Total</u>
Joint costs				
Variable				\$ 88,000
Fixed				148,000
Separable costs				
Variable		\$120,000	\$3,000	123,000
Fixed		90,000	2,000	92,000
Production in pounds	50,000	40,000	10,000	100,000
Sales price per pound	\$4.00	\$7.50	\$1.10	

There were no beginning or ending inventories. No materials are spoiled in production. Variable costs change in direct proportion to production volume. Bynd's net realizable value is deducted from joint costs. Joint costs are allocated to joint products to achieve the same gross margin percentage for each joint product.

Although 1989 performance could be repeated for 1990, Lond is considering possible operation of the plant at full capacity of 120,000 pounds. The relative proportions of each product's output with respect to cost behavior and production increases would be unchanged. Market surveys indicate that prices of Jana and Bynd would have to be reduced to \$3.40 and \$0.90, respectively. Reta's expected price decline cannot be determined.

Required:

Prepare the following schedules for Lond Co. for the year ended December 31, 1989:

1. Total gross margin.
2. Allocation of joint costs to Jana and Reta.
3. Separate gross margins for Jana and Reta.

NUMBER 6

Tredoc Co. is engaged in the business of seasonal tree-spraying and uses chemicals in its operations to prevent disease and bug-infestation. Employees are guaranteed 165 hours of work per month at \$8 per hour and receive a bonus equal to 75% of their net favorable direct labor efficiency variance. The efficiency variance represents the difference between actual time consumed in spraying a tree and the standard time allowed for the height of the tree (specified in feet), multiplied by the \$8 standard hourly wage rate. For budgeting purposes, there is a standard allowance of one hour per customer for travel, setup, and clearup time. However, since several factors are uncontrollable by the employee, this one-hour budget allowance is excluded from the bonus calculation. Employees are responsible for keeping their own daily time-cards.

Chemical usage should vary directly with the tree-footage sprayed. Variable overhead includes costs that vary directly with the number of customers, as well as costs that vary according to tree-footage sprayed. Customers pay a service charge of \$10 per visit and \$1 per tree-foot sprayed.

The standard static budget and actual results for June are as follows:

		<i>Static budget</i>		<i>Actual results</i>
Service calls	(200 customers)	\$ 2,000	(210 customers)	\$ 2,100
Footage sprayed	(18,000 feet)	<u>18,000</u>	(21,000 feet)	<u>21,000</u>
Total revenues		<u>20,000</u>		<u>23,100</u>
Chemicals	(1,800 gallons)	4,500	(2,400 gallons)	5,880
Direct labor:				
Travel, setup, and clearup	(200 hours)	\$1,600	(300 hours)	\$2,400
Tree-spraying	(900 hours)	<u>7,200</u>	(910 hours)	<u>7,280</u>
Total direct labor		8,800		9,680
Overhead:				
Variable based on number of customers		1,200		
Variable based on tree-footage		1,800		
Fixed		<u>2,000</u>		
Total overhead		<u>5,000</u>		<u>5,400</u>
Total costs		<u>18,300</u>		<u>20,960</u>
Gross profit before bonus		<u>\$ 1,700</u>		<u>\$ 2,140</u>

July's demand is expected to be in excess of June's and may be met by either paying a 25% overtime premium to current employees or by hiring an additional employee. A new employee will cause fixed costs to increase by \$100 per month. The potential increased demand may be estimated by considering the impact of increases of 20 and 30 customers, with probabilities of 70% and 30%, respectively.

Required:

a. Compute the following for June:

1. Direct materials price variance.
2. Direct materials usage (efficiency) variance.
3. Direct labor travel, setup, and clearup variance.
4. Direct labor bonus.
5. Overhead spending (flexible budget) variance.

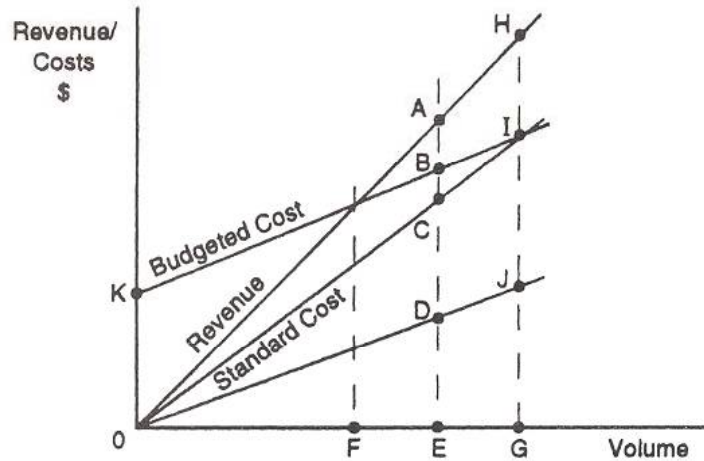
Indicate whether each variance is favorable or unfavorable.

b. Assume that Tredoc accepts all orders for services in July. Should Tredoc hire an additional employee? Provide supporting computations based on standard costs.

NUMBER 7

Items 1 through 5 are based on the following:

The diagram below depicts a manufacturing total cost flexible budget line KI and standard cost line OI. Line OJ is parallel to line KI, and revenues are represented by line OH.



Required:

For Items 1 through 5, identify the line on the graph that represents each item.

Items to be Answered:

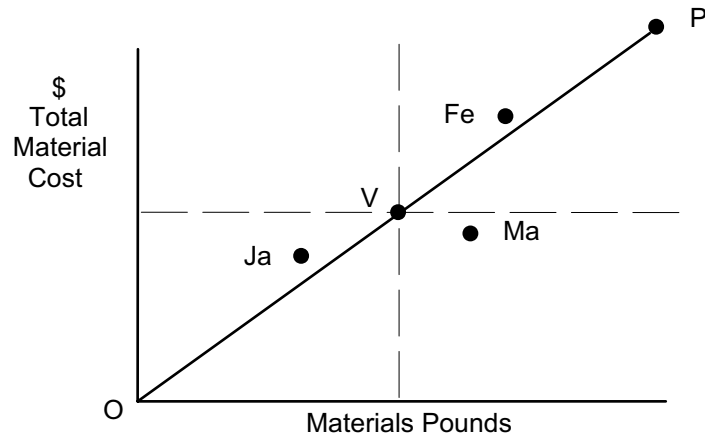
1. The budgeted fixed cost at volume OE.
2. The budgeted variable cost at volume OE.
3. The standard gross profit at volume OE.
4. The budgeted gross profit at volume OE, assuming **no** change between beginning and ending inventories.
5. The normal capacity, assuming standard costs are based on normal capacity.

NUMBER 8 (“Other Objective Answer Format”)

Problem Number 8 consists of 5 items. Select the best answer for each item. **Answer all items.** Your grade will be based on the total number of correct answers.

Items A through E are based on the following:

Bilco Inc. produces bricks and uses a standard costing system. On the diagram below, the line OP represents Bilco's standard material cost at any output volume expressed in direct material pounds to be used. Bilco had identical outputs in each of the first three months of 1992, with a standard cost of V in each month. Points Ja, Fe, and Ma represent the actual pounds used and actual costs incurred in January, February, and March, respectively.



Required:

For Items A through E, determine whether each variance is favorable or unfavorable.

Items to be answered:

- January material price variance.
- January material usage variance.
- February material price variance.
- February material usage variance.
- March material net variance.

Chapter Twelve

Solutions to Cost Accounting Questions

Joint Products and Standard Costs

1. (b) Relative profitability is inappropriate because profitability itself is affected by the allocation method; that is, there is circularity of reasoning.

2. (c) \$15,000 for Q and \$9,000 for R

Joint cost allocated to R:

$$\frac{\text{Sales value R at split-off}}{\text{Sales value of P, Q and R at split-off}} \times \text{Joint Cost } \$60,000 = \$9,000$$

Joint cost allocated to Q:

To P	\$36,000
To R	<u>9,000</u>
	\$45,000
Balance to Q	<u>15,000</u>
Total Joint Cost	\$60,000

3. (c) \$60,000

$$\frac{\text{P's Joint Cost } \$36,000}{\text{Total Joint Cost } \$60,000} = 60\%$$

$$60\% \times \text{Total Sales Value at split-off} - \$100,000 = \$60,000$$

4. (d) Allocation of joint costs

<i>Product</i>	<i>Sales Value at Split-Off</i>	<i>Percent</i>	<i>Cost to be Allocated</i>	<i>Allocated Cost</i>
W	\$ 80,000	40	\$160,000	\$ 64,000
X	60,000	30	160,000	48,000
Y	40,000	20	160,000	32,000
Z	<u>20,000</u>	<u>10</u>	160,000	<u>16,000</u>
Totals	\$200,000	100		\$160,000

5. (c) \$48,000.

	<u>Sales Value</u>	-	<u>Separable Cost</u>	=	<u>N.R.V.</u>	Relative
						<u>NRV</u>
Ajac	80,000		8,000		72,000	72/90 = 80%
Bjac	40,000		22,000		<u>18,000</u>	18/90 = 20%
					90,000	

Joint cost allocated to Ajac:

$$80\% \times \$60,000 = \underline{\$48,000}$$

6. (b) \$1 increase per unit sold

Increase in sales revenue	\$4 per unit
Increase in cost of goods sold*	<u>3</u> per unit
Increase in gross profit	1 per unit

* As unit would no longer be considered a by-product, cost of goods sold would not be reduced by the net realizable value of the units sold.

7. (a) The relative sales-value method under which joint-product costs are prorated to each product according to total sales value will result in a uniform gross-profit rate for all products.

e.g.:	<u>Product A</u>	<u>Product B</u>	<u>Total</u>
Sales Value	\$100 (1/3)	\$200 (2/3)	\$300
Less: Joint Costs	<u>50</u> (1/3)	<u>100</u> (2/3)	<u>150</u>
Gross Profit	<u>\$ 50</u> (50%)	<u>\$100</u> (50%)	<u>\$150</u> (50%)

8. (d) Sales value at split-off:

A 500 gal. × \$10	\$ 5,000
B 1,000 gal. × \$14	<u>14,000</u>
Total	\$19,000

Joint cost allocated to B:

$$\$4,560 \times 14,000/19,000 \quad \$ 3,360$$

Cost of subsequent processing

$$1,000 \text{ gal.} \times \$1 \quad \underline{1,000}$$

Total cost of 1,000 gal. of B \$ 4,360

9. (c) Joint cost allocated to B

$$\frac{\text{Sales value B at split-off}}{\text{Sales value A + B at split-off}} \times \text{joint cost } \$264,000 = \underline{\underline{\$90,000}}$$

Note: The sales value at split-off of the by-product X is irrelevant as joint costs are not allocated to by-products in this problem.

10. (d) A by-product is a product of relatively small value which is obtained during production of the main product. Answer (d) would be the best description of this.

11. (d) The "split-off point" occurs when two or more products which are produced simultaneously can be specifically identified and separated as individual products. These products may or may not require subsequent processing in order to be salable. Classification of simultaneously produced products as "joint products" or "by-products" is determined by their relative sales values. Simultaneously produced products of more than nominal value are classified as joint products, while those of relatively small or insignificant sale value are classified as by-products.

12. (b) The cost of by-products **may** include an allocation of joint costs; however, this allocation is normally not made.

13. (c) Joint cost allocated to E

$$\frac{\text{E's Sales value at split off}}{\text{Total Sales value at split off}} \times \text{Joint Cost}$$

$$\frac{\$ 30,000}{\$200,000} \times \$120,000 = \$18,000$$

<u>Joint cost allocated to D</u>	
Total Joint Cost	\$120,000
Less: Joint cost allocated to:	
C (given)	(72,000)
E (above)	<u>(18,000)</u>
Joint cost allocated to D	<u>\$ 30,000</u>

14. (c) Sales of E		\$40,000
Less: Cost of E		
Joint cost (above)	18,000	
Subsequent Costs	<u>6,000</u>	<u>24,000</u>
Gross Profit on E		<u>\$16,000</u>

Note: 2,000 units of E were originally produced and all 2,000 were processed further and sold; therefore, all joint costs and subsequent processing costs for E are included in cost of goods sold.

15. (c) The relative sales value of joint products may be unknown at the point of split-off or because of extensive subsequent processing required to make the product salable, may be difficult to determine. In such cases, it is recommended that the subsequent costs be applied as a reduction in revenue on a dollar-for-dollar basis and the remaining revenue used as the sales value at split-off for assignment of joint cost.

16. (d) Under the relative sales value at split-off method of allocating joint costs, an increase in the market value of P at split-off would increase the proportion and amount of joint costs allocated to P and decrease the joint costs allocated to Q. As all other costs and selling prices remain unchanged, the increase in joint costs allocated to P would result in a decrease in P's gross margin while the decrease in joint costs allocated to Q would result in an increase in Q's gross margin.

17. (a) \$0 profit.

Net realizable value is an item's selling price less the costs to complete and dispose of the item. When a by-product (or an inventory item) is valued at its net realizable value, no profit or loss results from its sale.

1991 sales of Moy (\$5,000 × \$6)	\$30,000
Less cost of goods sold (\$5,000 × \$4)*	<u>(20,000)</u>
Gross profit—Moy	\$10,000
Less selling costs (\$5,000 × \$2)	<u>(10,000)</u>
Net profit	<u><u>—0—</u></u>

* Net realizable value = selling price – cost to complete and dispose = \$6 – \$2 = \$4.

18. (c) When the actual sales value at the split-off point is not known, the final sales value is reduced by costs subsequent to the split-off point to determine the relative value at split-off. Therefore, if subsequent costs for product Z increase while those of Y remain constant, Z's relative value would decrease resulting in less joint costs being allocated to Z and more being allocated to Y.

19. (a) Self-explanatory.

20. (a) Flexible budgeting is a reporting system wherein the planned level of activity is adjusted to the actual level of activity before the budget to actual comparison report is prepared. It may be appropriately employed for any item which is affected by the level of activity.

In standard costing, product costs are predetermined and set up as a goal to be attained. Actual performance is compared to the standard. A primary objective of a standard costing system is to control costs.

21. (a) The amount being produced within a period (volume) is driven by the sales forecast, which is generally more controllable by the sales department rather than the production department. Production then, in turn, controls material, labor and overhead efficiency or usage.

22. (b) Since the material price variance relates to the difference between standard price and actual price and might be viewed as measuring the performance of the company's purchasing department, the variance should be determined on the basis of the units purchased and should therefore be computed when the purchase occurs.

23. (b) This method provides for allocation among all units that were handled during the period.

24. (c) Because the amounts are immaterial, allocation is not warranted; hence, they are treated as a determinant of the current period's earnings only.

25. (c)	Actual direct labor hours used	1,050	
	Standard direct labor hours allowed		
	500 units × 2 hours per unit	<u>1,000</u>	
	Excess hours	50	
	Standard direct labor rate	<u>× \$6</u>	
	Direct labor efficiency variance	<u>\$ 300</u>	(UF)

26. (c) Standard costs may be used in either job order costing or process costing. Standard costing is a cost estimation technique used for control purposes and to simplify costing procedures and expedite cost reports. The system of recording costs (job order or process) is independent of the costs to be recorded (standard or actual).

27. (a) All purchases are "charged in" at standard. Therefore, the debit to raw materials for the purchase of item 1 would be: 100,000 ft. × \$.75 = \$75,000.

28. (c) Debits to work-in-process for direct labor: 8,000 units × 4 hrs. × \$3.50 = \$112,000.

29. (d) Materials usage variance for item 2:

	<u>Units</u>	×	<u>Price</u>	
	Actual		Standard	
	26,000 ft.		\$1.00	\$26,000
	Standard		Standard	
	24,000 ft.*		\$1.00	<u>24,000</u>
	Unfavorable variance (debit)			<u>\$ 2,000</u>

* 8,000 units × 3 ft. per unit.

30. (a) The materials-usage variance does not arise until the materials are placed into production. Therefore, no part of the variance will be prorated to raw-materials inventory.

31. (d)	Actual price paid per foot	\$.78
	Less: Standard price per foot	<u>.75</u>
	Material-price variance per foot	<u>\$.03</u> (unfav.)
	Ending raw materials inventory	22,000 ft.
	Price variance per foot	<u>× \$.03</u>
	Material price variance to be prorated to raw materials	<u>\$ 660</u> dr

32. (b) The best basis upon which standards should be established is always the normal, or currently attainable performance. Setting them at the ideal or theoretical maximum capacity creates standards which may never be met, resulting in frustration amongst the workers and rendering the cost reports meaningless. By establishing performance standards too low, they may cause workers to reduce their output in order to hit the low standards, unknown to management.

33. (a) An unfavorable labor rate variance suggests that the labor cost was higher than anticipated, and a favorable labor efficiency variance implies that more productive work occurred than had been expected.

34. (a) \$40,000 actual overhead.

Standard manufacturing costs	\$100,000
Add: Excess of actual manufacturing costs over standard costs	<u>20,000</u>
Total actual manufacturing costs	\$120,000
Less: Actual prime costs (direct materials and direct labor)	<u>(80,000)</u>
Actual manufacturing overhead costs	<u>\$ 40,000</u>

35. (b) A credit balance indicates a favorable variance, with standard hours allowed being greater than actual hours used.

36. (c) 2,000 favorable.

Set-up information given:

$$20,000 \times ? = \$40,000$$

$$20,000 \times 2.10 = ?$$

Fill in the blanks:

$$20,000 \times \$2.00 = \$40,000$$

$$20,000 \times \$2.10 = \$42,000 \quad \text{Fav. 2,000 CR}$$

$$\text{or simply } 20,000 \times (2.10 - 2.00) = \$2,000 \text{ FAVORABLE}$$

37. (a) Actual number of pounds in excess of standard is unfavorable; actual cost being less than standard cost is favorable.

38. (c) Actual quantity 1,600 @ std. price \$3.60	= 5,760
Less: Favorable price variance	<u>(240)</u>
Actual quantity 1,600 @ actual price	5,520
÷ actual quantity	÷ <u>1,600</u>
= actual price per unit	<u>\$3.45</u>

39. (d) 1,600. Set up a variance computation schedule and work backwards.

Standard hours	×	Standard rate		
1,500	×	\$6.00	= \$9,000	} \$600 U
Actual hours	×	Standard rate		
(1)	×	\$6.00	= (2)	

$$(2) = \$9,000 + \$600 \text{ unfavorable variance or } \$9,600$$

$$(1) = \$9,600 \div \$6.00 \text{ or } 1,600$$

Also, since the efficiency variance is the difference between actual hours and standard hours times the standard rate, the variance can be divided by \$6.00 ($\$600 \div 6.00 = 100 \text{ hours} + 1,500 \text{ hours} = 1,600$)

40. (c) \$1,400 favorable

The net overhead variance is the difference between actual overhead, \$12,600, and overhead applied to product cost or standard.

Actual overhead	\$12,600
Standard 3,500 hours allowed × total overhead rate per hour \$4.00	<u>14,000</u>
Favorable total variance	\$ 1,400

41. (b) Actual hours × actual rate = Total payroll

$$\begin{aligned} \text{Actual rate} &= \frac{\text{Total payroll}}{\text{Actual hours}} \\ &= \frac{\$110,200}{29,000} \\ &= \$3.80 \end{aligned}$$

42. (c) Rate variance = Actual hours × the difference between the standard and actual rates (D)
 $\$5,800 = 29,000 \text{ D}$
 $\text{D} = \$0.20 \text{ per hour}$

Because the rate variance is favorable, the standard rate must be \$.20 more than the actual rate of \$3.80, or \$4.00.

43. (c) Spending variance—unchanged; Volume variance—increased.

The overhead spending (budget) variance is the difference between actual overhead costs and budgeted overhead costs at the actual level of activity achieved. The activity level used to determine the predetermined rate for overhead allocation has no effect on this variance.

The overhead volume variance is the difference between budgeted overhead costs at the standard level of activity for the production achieved and applied overhead costs. It is attributable to the over- or under-application of fixed costs, due to production at an activity level other than where the predetermined overhead rate was determined. If the activity level used to determine the predetermined overhead rate was increased (80% of practical capacity to 100%), the fixed overhead application rate would decrease and less fixed overhead would be applied per unit of activity achieved. This would result in an increase in an unfavorable (underapplied) or a decrease in a favorable (overapplied) volume variance.

44. (c) If over- or underapplied overhead is interpreted as an error in allocating actual costs, then this error should be corrected by prorating the variance to the components affected: cost of goods sold and ending inventories.

(Note: Over- or underapplied overhead is the difference between actual overhead and overhead applied at a predetermined rate.)

45. (b) An unfavorable direct labor efficiency variance represents the number of actual hours required over the number of standard labor hours allowed for that level of output, multiplied by the standard labor rate. For making 1,000 we were allowed:

1,000 units @ 4 hours per unit =	4,000 hours allowed
Actual hours	<u>4,100</u>
Excess hours over standard	100
Standard rate	<u>\$ 12</u>
Variance	<u>\$1,200</u>

46. (c) Under the two variance method of overhead analysis:

Controllable Variance = actual overhead vs. budgeted overhead at standard activity base allowed for the production achieved (if using standard costs) or budgeted overhead at actual activity base used (if using actual costing techniques—not standard costing).

Volume Variance = budgeted overhead at standard activity base (or actual activity base if not using standard costing) vs. applied overhead.

47. (a) Material usage variances cannot occur until materials are placed into production. Production does not occur in purchasing and warehousing. Purchasing and warehousing may be charged the material purchase price variance.

48. (d) The variable overhead rate would be the same for all three activity levels. By definition, variable overhead would be the same per unit, machine hour, etc., within a relevant range of capacity.

49. (b) A static budget is not adjusted to the actual level of activity before the budget to actual comparison report is prepared. Therefore, a level of activity below the budget level would usually result in favorable variance for variable cost items (total cost changes with change in the level of activity). However, fixed cost items (total cost does not change with changes in the level of activity) would not usually show favorable (or unfavorable) variances as the cost would not differ from budget as a result of the decrease in activity.

50. (b)	Actual Overhead	\$178,500	
	Less: Spending Variance	<u>8,000</u>	Unf
	Budget	170,500	
	Less: Fixed Costs	<u>110,000</u>	
		<u>\$ 60,500</u>	÷ \$.50 = <u>121,000</u> hours

51. (d)	Overhead Rate	\$1.50	
	Variable Portion	<u>.50</u>	
	Fixed Portion	\$1.00	
	Fixed Cost	\$110,000	
	Normal Volume	110,000	hours
	Volume Variance	\$5,000	÷ \$1 = 5,000 hours
	Standard Hours	110,000	+ 5,000 = <u>115,000</u>

Total Variance Computation:

Actual	178,500	
Budget	170,500	8,000 UNF
110,000 + 121,000 × .50		
Efficiency	167,500	3,000 UNF
110,000 + 115,000 × .50		
Volume	172,500	5,000 FAV
115,000 × 1.50		

This answer is based on the use of standard hours in computing the efficiency variance. This is not the only way this variance can be computed, but the question does not allow for alternative answers.

52. (d)	\$123,000
Budget	\$50,000 + 18,000 × \$4 = \$122,000
Add: Budget variances	
(unfavorable)	<u>1,000</u>
Actual Overhead	\$123,000

53. (c) 122,500

Actual Overhead		
(see previous solution)	\$123,000	
Budget \$50,000 + 18,000 × \$4	122,000 Unf. \$1,000 Budget Var.	
Applied Overhead	¹ 122,500 Fav. \$500 Volume Var.	

¹Add the volume variance to Budget \$122,000 + \$500 = \$122,500

Note: For further practice compute the total overhead rate and normal activity:

Total overhead rate = \$122,500 ÷ 18,000 = \$6.80 (rounded)
 Normal = \$6.80 – \$4.00 = \$2.80 (fixed portion of rate)
 FC \$50,000 ÷ 2.80 = 17,857 labor hours

54. (a) \$750 favorable

Actual overhead	\$15,000	
Budget (actual hours)		
\$7,000 + 3,500 × \$2.50	\$15,750	\$750 spending var. (favorable)
* Budget (standard hours)		
\$7,000 + 3,800 × \$2.50	\$16,500	\$750 efficiency var. (favorable)

* Not required. The volume variance cannot be determined with the facts given.

55. (b) Actual overhead: variable	73,000	
Actual overhead: fixed	<u>17,000</u>	90,000
Applied overhead		
Variable 2.50 × 32,000 std. hrs.	80,000	
Fixed .50 × 32,000 std. hrs.	<u>16,000</u>	<u>96,000</u>
Favorable variance (overapplied)		<u>6,000</u>

56. (b) Volume variance—favorable; Efficiency variance—unfavorable.

The overhead volume variance is the difference between budgeted overhead costs at the standard level of activity for the production achieved (line DB, overhead flexible budget line) and applied overhead costs (line OA, standard overhead application line). As line OA (applied overhead) is above line OB (budgeted overhead) at point V, the standard hours required for actual output, the volume variance is favorable (applied overhead exceeds budget at standard).

The overhead efficiency variance is the difference between budgeted overhead at the actual level of activity and budgeted overhead at the standard level of activity for the production achieved. As point S, the actual level of activity (machine hours) is greater than (is to the right of) point V, the standard hours required for actual output, the budget at actual activity exceeds the budget at standard activity and the overhead efficiency variance is unfavorable.

57. (d) BC minus DO.

Line BC = Total costs at C machine hours
 Line DO = Fixed costs, total cost at zero machine hours
 Variable cost = Total cost – fixed costs
 = BC – DO

58. (b) \$420 Favorable.

Material Price Variance	=	Actual Quantity (Actual Price vs. Standard Price)
	=	\$4200 (\$2.40 - \$2.50)
	=	<u>\$420</u>

Actual Price = \$10,080 / 4200 meters = \$2.40

The Variance is favorable as the actual price is less than the standard price.

59. (c) \$51,000

$$\frac{\text{Change in Cost}}{\text{Change in Units}} = \frac{75,000 - 15,000}{20,000} = \frac{\$60,000}{20,000} = \$3 \text{ Variable Cost per unit}$$

Total Cost of 12,000 Units:	
Variable Cost (\$3 x 12,000)	\$36,000
Fixed Cost	<u>15,000</u>
Total Cost	<u>\$51,000</u>

60. (a) \$30 standard direct labor costs per unit.

Weekly wages per worker	\$500
Add: Benefits treated as direct labor	<u>100</u>
	\$600
# of productive hours per week, per worker	÷ <u>40</u>
Standard direct labor costs per hour	\$ 15
# hours required per unit	× <u>2</u>
Standard direct labor costs per unit	<u>\$ 30</u>

61. (b) Under the two variance method of overhead analysis:

Controllable variance = **actual overhead** vs. budgeted overhead at standard activity base allowed for the production achieved.

Volume variance = budgeted overhead at standard activity base allowed for the production achieved vs. applied overhead based upon standard activity base allowed for production achieved.

62. (c) The spending (budget) variance is considered a measure of the control of spending in that actual overhead costs are compared with budgeted overhead costs at the actual activity achieved.

The volume (capacity) variance does not relate to the control of overhead costs as it is attributable to the over- or under-application of fixed costs, due to production at an activity level other than where the predetermined overhead rate was originally determined.

63. (b) Overhead is generally applied based upon direct labor hours. The unfavorable overhead efficiency variance represents the number of actual hours required over the number of standard labor hours allowed for that level of output, multiplied by the standard variable overhead rate. For making 5,000 units we were allowed:

5,000 units @ 2 hours per unit =	10,000 hours allowed
Actual hours	<u>10,500</u>
Excess hours over standard	500
Standard rate	<u>\$ 3</u>
Variance	<u>\$1,500</u>

64. (c) Actual unit price	\$ 3.60
Less unfavorable price variance per unit	
\$3,600 ÷ 18,000	<u>(.20)</u>
Standard price per unit	3.40
Standard quantity allowed	16,000
Actual quantity used	<u>15,000</u>
Quantity difference (favorable)	1,000
Standard price per unit	× <u>\$3.40</u>
Favorable quantity variance	<u>\$ 3,400</u>

65. (a) A Standard cost system can be used for cost control by/for any company, product, process or service for which standard costs can be established.

66. (d) As point A is above line OW (standard), the actual rate exceeds the standard rate for the direct labor hours used, therefore, the rate variance is unfavorable.

As point A is to the left of point S, the actual direct labor hours used were less than the standard hours allowed for the actual output, therefore, the efficiency variance is favorable.

67. (a) Under the three (3) variance method, the spending variance is the difference between actual overhead and the budget for overhead at actual activity base.

68. (a) Under the two variance method of overhead analysis:

Controllable variance = actual overhead vs. budgeted overhead at standard activity base allowed for the production achieved.

Volume variance = Budgeted overhead at standard activity base allowed for the production achieved vs. applied overhead based upon standard activity base allowed.

69. (d) Direct materials requirement per unit
 (2 yards per finished unit ÷ 80%*) 2.5 yards
 Cost per yard × \$3
 Standard direct materials cost per unit \$7.50

* If direct material spoilage is 20% of input quantities, output quantities are 80% of input (100% – 20%).

70. (a) Actual quantity purchased @ actual cost = 100,000 lbs @ \$.17 = \$17,000
 Actual quantity purchased @ standard cost = 100,000 lbs. @ \$.20 = 20,000
 Favorable material price variance (on purchases) \$ 3,000

71. (c) Actual hours @ standard rate = 3900 hrs. @ \$7 = \$27,300
 Standard hours @ standard rate = 4000 hrs. @ \$7 = 28,000
 Favorable labor efficiency variance \$ 700

Standard hours = .4 hrs./unit × 10,000 units produced = 4000 standard hrs.

72. (b) High-low points method:

	<u>High</u>	<u>Low</u>	<u>Change</u>
Direct-labor hours	400,000	300,000	100,000
Total costs	\$154,000	\$129,000	\$25,000

The change between the high and low points isolates the variable costs which are \$.25 per hour (\$25,000 % 100,000 hours).

At the high point, total variable costs are \$100,000 (400,000 hours × \$.25). Therefore, total fixed costs budgeted are \$54,000 (\$154,000 – \$100,000). Budgeted fixed costs can also be calculated using the low point.

(300,000 hrs. × \$.25 = \$75,000 total variable costs + \$54,000 fixed costs = \$129,000 total costs)

73. (c) Analysis of Fixed and Variable Costs Through the High-Low, Two-Point Method

The high-low method is used to isolate the fixed and variable portions of costs by analysis of the high and low points of activity.

	<u>Cost</u>	<u>Machine Hours</u>
High	\$39,200	24,000
Low	<u>32,000</u>	<u>15,000</u>
Change	\$ 7,200	9,000
Change per machine hour		<u>\$7,200</u> = \$.80
		9,000

By definition of a variable cost (changes proportionately with changes in volume), the \$.80 per machine hour change is the variable portion of the maintenance costs.

74. (b) Computation of Fixed Costs

	<u>High</u>	<u>Low</u>
Total Costs	\$39,200	\$32,000
Less: Variable Costs from above:		
24,000 × \$.80	19,200	
15,000 × \$.80		<u>12,000</u>
Fixed costs per month	<u>\$20,000</u>	<u>\$20,000</u>

NOTE: Only one computation is needed; however, both are shown to illustrate that the result is the same.
 $12 \times \$20,000 = \$240,000$ total annual fixed costs.

75. (b) Under the two variance method: The controllable (budget) variance is the difference between the actual overhead and the budgeted overhead. Both of these contain variable and fixed costs and either fixed or variable costs can vary from the budget.

The volume variance is due solely to fixed costs. It is the difference between the budgeted overhead and applied overhead based upon the same level of activity as the budget. Because the budget and applied activity bases are the same, budgeted variable overhead will equal applied variable overhead, and any volume variance is due solely to fixed costs.

Note: The answer is the same for both actual and standard costing. The difference between actual and standard, under the two variance method, is the activity base used for the budgeted overhead. Under actual costing, the activity base used would be the actual activity base achieved, while under standard costing, it would be the standard activity base for the production achieved.

Chapter Twelve

Solutions to Cost Accounting Problems

Joint Products and Standard Costs

NUMBER 1

a. 1. A variable cost is a cost that increases in a linear manner (within a relevant range) with respect to an activity factor, such as units of production, direct labor hours, or machine hours. The variable cost may or may not increase in a one-to-one ratio with the activity factor. For example, each unit produced may incur more than one unit of labor (hour) or material (pound), but it is assumed that for each unit produced the same number of units of labor (hours) or materials (pounds) will be used. Another essential assumption of a true variable cost is that if a unit of activity does not occur, the cost is not incurred. In theory, if the variable cost per unit of activity is known and the total activity factor is known, the variable cost can be computed by multiplying the per-unit cost by the activity factor.

2. A fixed cost, as opposed to a true variable cost, does not react to activity in that the amount remains constant regardless of the level of activity within a relevant range. Fixed costs are often referred to as "step costs." For a given range of activity the amount of fixed costs is constant; however, if one additional unit of activity occurs, the next entire relevant range of cost may be incurred. When presented graphically, this situation appears to be an ascending series of steps, the breadth of each step being one relevant range. As an example, when the productive capacity of a plant is fully utilized, additional plant capacity will be needed to produce one additional unit of product. This additional capacity represents an entirely new fixed cost (rent or depreciation) with a new range of production. Fixed costs generally occur whether or not activity occurs; however, some fixed costs may be stair-stepped upward or downward as activity is increased or reduced, and fixed costs per unit of activity within a relevant range have an inverse relationship to activity. That is, the more units produced within a relevant range, the less fixed cost to be "absorbed" by each unit.

b. 1. A semivariable cost is a cost that reacts to a change in activity, but not with the direct relationship that a true variable cost exhibits. A semivariable cost is made up of two components: a variable cost and a fixed cost. Therefore (within a relevant range), there is an element of a semivariable cost that does respond in direct proportion to a change in the activity factor, but there is also an element of cost that remains unchanged in relation to the activity factor.

2. The managerial accountant analyzes a semivariable cost by separating the cost into its variable and fixed components. Three basic methods can be used to separate these components.

The first is the *"scattergraph" method*, by which a graph is drawn with semivariable cost amounts on the vertical y axis and activity on the horizontal x axis. The accountant then plots various values of the semivariable cost at different activity levels and attempts to draw a straight line through the points that will approximate the trend shown by the greatest number of plotted points. The point at which this line intersects the y axis is approximately the fixed-cost element of the semivariable cost. The variable component is determined by subtracting the fixed element from the total cost.

The second method is the *high-low method*, which analyzes the change in the semivariable cost at two different activity levels. Since the only change in the cost is brought about by the variable element of the cost, the difference in amounts of the cost divided by the change in activity level will give the variable cost per unit of change in the activity level. At any given activity level, the variable component of the cost is computed by multiplying the activity level by the variable cost per unit of activity. The fixed component is then computed by subtraction. It must be noted that because the high-low method uses only two data points, it may not yield answers that are as accurate as those derived when a larger number of points are considered as in the other two methods.

The third method of breaking out the variable and fixed components of a semivariable cost is called the *"least-squares" method* or *"simple regression" analysis*. This method analyzes the difference between the mean activity and mean amounts of the total cost as compared to the actual values for activity and amounts and mathematically computes a line drawn through a set of plotted points such that the sum of the squared deviations of each actual plotted point from the point directly above or below it on the regression line is at a minimum. The computation is as

follows. For each known value of the total cost, the difference between the actual activity and average activity is squared; the results of this operation are then added together. Simultaneously, for each known value of the total cost, the difference between the actual cost and average cost for all known values is multiplied by the difference between actual activity level and average activity level at that cost; the results of this operation are then added together. Finally, the summed results of the squared activity differences are divided into the summed results of the differences for activity times difference from mean cost to yield the variable factor per unit of activity. The fixed-cost component can be computed by subtraction after computing total variable cost at a given activity level. The fixed-cost component can also be computed by substituting the variable cost factor and mean total cost and activity factors into the general equation for a straight line; $y = a + bx$. In this equation y equals average total cost, a equals the fixed-cost element, b equals the variable cost factor, and x equals the average activity level.

There must be a high level of correlation between the activity base and the cost for any of the three methods to be reliable. Correlation can be computed mathematically.

NUMBER 2

Webb & Company March

a.

<u>(1) Equivalent Units</u>	<u>Labor</u>	<u>Overhead</u>
Returns completed (200 + 825 – 125)	900	900
Returns in process, 3/31 (125 × 80%)	<u>100</u>	<u>100</u>
Equivalent units	<u>1,000</u>	<u>1,000</u>

<u>(2) Actual Cost Per Equivalent Unit</u>	<u>Labor</u>	<u>Overhead</u>
Cost of returns in process, 3/1	\$ 6,000	\$ 2,500
Add: March costs	<u>89,000</u>	<u>45,000</u>
Total costs	95,000	47,500
Divided by weighted average equivalent units	÷ <u>1,000</u>	÷ <u>1,000</u>
Actual cost per equivalent unit	<u>\$95.00</u>	<u>\$47.50</u>

b. Actual Cost of Returns in Process at 3/31

Labor (125 returns × 80% × \$95.00)	\$ 9,500
Overhead (125 returns × 80% × \$47.50)	<u>4,750</u>
Total	<u>\$14,250</u>

c. Standard Cost Per Return

Labor (5 hrs. @ \$20)	\$100
Overhead (5 hrs. @ \$10)	<u>50</u>
Total	<u>\$150</u>

d. Analysis of March Performance

- (1) Total labor variance (actual minus standard)
 $\$89,000 - (950^* \times \$100) = \$6,000$ favorable
- (2) Labor rate variance
 $[(\$89,000 \div 4,000) - \$20] \times 4,000 = \$9,000$ unfavorable
- (3) Labor efficiency variance
 $[4,000 - (950^* \times 5)] \times \$20 = \$15,000$ favorable
- (4) Total overhead variance (actual minus standard)
 $\$45,000 - (950^* \times \$50) = \$2,500$ favorable
- (5) Overhead volume variance
 $\$49,000 - (950^* \times \$50) = \$1,500$ unfavorable
- (6) Overhead budget variance
 $\$45,000 - \$49,000 = \$4,000$ favorable

	<u>Labor</u>	<u>Overhead</u>
*Equivalent units (weighted average method)	1,000	1,000
Less equivalent units beginning inventory (25% × 200)	<u>50</u>	<u>50</u>
Equivalent units for current production	<u>950</u>	<u>950</u>

NUMBER 3

a.

Armando Corporation

COMPUTATION OF VARIABLE AND FIXED FACTORY OVERHEAD PER UNIT

Factory overhead per unit		
Variable (\$30 × 2/3)		\$20.00
Fixed (\$30 × 1/3)		<u>10.00</u>
Total		<u>\$30.00</u>

Schedule 1--Computation of Variable Factory Overhead Rate Per Direct Labor Hour

<u>Variable factory overhead per unit</u>	<u>\$20.00</u>	
Direct labor hours per unit	4	<u>\$ 5.00</u>

Schedule 2--Computation of Total Fixed Factory Overhead

Direct labor hours (2,400) × Fixed factory overhead rate per direct labor hour (\$10.00 ÷ 4 hours)	<u>\$ 6,000</u>
--	-----------------

b.

COMPUTATION OF VARIANCES

Month Ended July 31

Schedule 1--Materials Price Variance Based on Purchases

Direct materials actually purchased (18,000 × \$1.38)	\$24,840
Standard cost of above (18,000 × \$1.35)	<u>24,300</u>
Materials price variance—unfavorable	<u>\$ 540</u>

Schedule 2--Materials Usage Variance

Actual quantity used at standard cost (9,500 × \$1.35)	\$12,825
Standard quantity allowed (500 units × 20 yards) at standard cost (10,000 × \$1.35)	<u>13,500</u>
Materials usage variance—favorable	<u>\$ 675</u>

Schedule 3--Labor Rate Variance

Actual hours at actual rate (2,100 × \$9.15)	\$19,215
Actual hours at standard rate (2,100 × \$9.00)	<u>18,900</u>
Labor rate variance—unfavorable	<u>\$ 315</u>

Schedule 4--Labor Efficiency Variance

Actual hours at standard rate (2,100 × \$9.00)	\$18,900
Standard hours allowed—500 units × 4 at standard rate (2,000 × \$9.00)	<u>18,000</u>
Labor efficiency variance—unfavorable	<u>\$ 900</u>

Schedule 5--Controllable Factory Overhead Variance

Actual total factory overhead		\$16,650
Budgeted factory overhead at standard hours		
Fixed	\$ 6,000	
Variable (500 units × 4 hours × \$5.00)	<u>10,000</u>	<u>16,000</u>
Controllable factory overhead variance—unfavorable		<u>\$ 650</u>

Schedule 6--Capacity (Volume) Factory Overhead Variance

Budgeted factory overhead at standard hours	\$16,000
Applied total factory overhead	
Hours allowed—2,000 × \$7.50 (5/6 × \$9.00)	<u>15,000</u>
Capacity factory overhead variance—unfavorable	<u>\$ 1,000</u>

NUMBER 4

1. A factory overhead variance analysis report provides periodic identification of deviations from planned outcomes. It provides a basis for further analysis, investigation, and follow-up action. It is useful in developing budgets and standards for future operations. Variances can be used to identify changes in operations that need to be reflected in such activities as product pricing, compensation rates, maintenance levels, and so forth. The report can be helpful in identifying costs incurred that should be classified as losses rather than product costs.

2. The two-variance method breaks down the overall factory overhead variance--that is, the difference between the actual factory overhead and the factory overhead applied to production--into two components. They are (a) the controllable (budget) variance and (b) the volume (denominator) variance.

The controllable (budget) variance is the difference between the actual factory overhead and the budget allowance based on standard hours allowed. The department managers have the responsibility to exercise control over the costs to which the variances relate.

The volume (denominator) variance is the difference between the budget allowance based on standard hours allowed and the factory overhead applied to production. The variance indicates the cost of capacity available but not utilized or not utilized efficiently, and such variance is generally considered the responsibility of management.

NUMBER 5

1.

Lond Co.
TOTAL GROSS MARGIN
For the Year Ended December 31, 1989

	<u>Jana</u>	<u>Reta</u>	<u>Total</u>
Sales	\$200,000	\$300,000	<u>\$500,000</u>
Cost of sales			
Joint costs (\$236,000 – \$6,000)			230,000
Separable costs		210,000	<u>210,000</u>
Total costs			<u>440,000</u>
Total gross margin (12%)			<u>\$ 60,000</u>

2.

Lond Co.
ALLOCATION OF JOINT COSTS
For the Year Ended December 31, 1989

	<u>Jana</u>	<u>Reta</u>	<u>Total</u>
Sales	<u>\$200,000</u>	<u>\$300,000</u>	<u>\$500,000</u>
Less gross margin (12%)*	24,000	36,000	60,000
Less separable costs		<u>210,000</u>	<u>210,000</u>
Total deductions	<u>24,000</u>	<u>246,000</u>	<u>270,000</u>
Joint costs	<u>\$176,000</u>	<u>\$ 54,000</u>	<u>\$230,000</u>

*Gross margin = \$60,000 total gross margin ÷ \$500,000 total sales (from part 1).

3.

Lond Co.
PRODUCT GROSS MARGINS
For the Year Ended December 31, 1989

	<u>Jana</u>	<u>Reta</u>	<u>Total</u>
Sales	\$200,000	\$300,000	\$500,000
Cost of sales			
Joint costs (from part 2)	176,000	54,000	230,000
Separable costs	<u>176,000</u>	<u>210,000</u>	<u>210,000</u>
Total costs	<u>176,000</u>	<u>264,000</u>	<u>440,000</u>
Gross margins	<u>\$ 24,000</u>	<u>\$ 36,000</u>	<u>\$ 60,000</u>

NUMBER 6

a. 1.

DIRECT MATERIALS PRICE VARIANCE

Actual cost	2,400 gallons @ \$2.45 per gallon	\$5,880
Standard cost	2,400 gallons @ \$2.50 per gallon	<u>6,000</u>
Price variance		<u>\$ 120</u> Favorable

a. 2.

DIRECT MATERIALS USAGE VARIANCE

Actual usage	2,400 gallons	
Standard usage:		
$\frac{1,800}{18,000} \times 21,000 \text{ feet} =$	<u>2,100</u> gallons	
Usage variance	<u>300</u> gallons @ \$2.50	<u>\$ 750</u> Unfavorable

a. 3.

DIRECT LABOR TRAVEL, SETUP, AND CLEARUP VARIANCE

Actual cost	300 hours @ \$8.00 per hour	\$2,400
Standard cost:		
210 customers		
× 1 hour each	210 hours @ \$8.00 per hour	<u>1,680</u>
Variance		<u>\$ 720</u> Unfavorable

a. 4.

DIRECT LABOR BONUS

Actual direct labor (tree-spraying)	910 hours @ \$8.00 per hour	\$7,280
Standard direct labor:		
$\frac{900}{18,000} \times 21,000 \text{ feet} =$	1,050 hours @ \$8.00 per hour	<u>8,400</u>
Direct labor efficiency variance		\$1,120 Favorable
Incentive		<u>× .75</u>
Bonus		<u>\$ 840</u>

a. 5.

OVERHEAD SPENDING VARIANCE

Actual overhead			\$5,400
Standard overhead:			
Variable			
210 customers × (\$1,200/200)	\$1,260		
21,000 feet × (\$1,800/18,000)	2,100		
Fixed	<u>2,000</u>		<u>5,360</u>
Spending variance			<u>\$ 40</u> Unfavorable

b.

**ANALYSIS TO DETERMINE ADVISABILITY OF
HIRING AN ADDITIONAL EMPLOYEE**

Direct labor costs of overtime for current employees

Estimated increase in volume:

20 additional customers with 70% probability	14
30 additional customers with 30% probability	<u>9</u>
Weighted average number of new customers	<u>23</u>

Travel, setup, and cleanup

1 hour for each of 23 new customers	23.0
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Tree-spraying

4.5 hours for each of 23 new customers	<u>103.5</u>
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Total overtime hours	<u>126.5</u>
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Total direct labor overtime costs

126.5 hours × \$8 per hour × 1.25 (for 25% overtime premium)	<u>\$1,265</u>
--	----------------

vs.

Costs of hiring an additional employee

Variable (165 hours at \$8 per hour)	\$1,320
Fixed	<u>100</u>
Total costs of hiring an additional employee	<u>\$1,420</u>

This analysis demonstrates that it would not be cost effective for Tredoc to hire an additional employee.

NUMBER 7

The diagram presented depicts a manufacturing total cost flexible budget with lines for revenue (OH) and standard costs (OI) superimposed. It may also be viewed as a breakeven chart with a standard cost line added.

The manufacturing costs are represented as follows:

<u>Line</u>	<u>Description</u>
OJ	Variable costs
KI	Total costs
KO	Fixed costs (total cost at zero volume)

1. Line BD
Line KI is parallel to line OJ.
Therefore, line BD (at E volume) equals line KO (at zero volume), the fixed costs.
2. Line DE
Line OJ represents variable costs.
Therefore, line DE represents total variable costs at volume OE.
3. Line AC
Standard gross profit = Revenue -- Standard cost.
At volume OE, line AC is the difference between Revenue (line OH) and standard cost (line OI).
4. Line AB
Budgeted gross profit = Revenue -- Budgeted cost.
At volume OE, line AB is the difference between Revenue (line OH) and Budgeted cost (line KI).
5. Line OG
Standard cost equals budgeted cost at point I; therefore, the standard was based upon volume OG. Assuming standard costs are based on normal capacity, as stated, then volume OG equals normal capacity.

NUMBER 8

- A. Unfavorable—January material price variance.
As point Ja is above the standard material cost line (OP), the actual price exceeded the standard price for actual pounds used, therefore, January's material price variance is unfavorable.
- B. Favorable—January material usage variance.
As point Ja lies to the left of point V (standard for actual production), actual pounds used were less than the standard pounds allowed for actual output, therefore, January's material usage variance is favorable.
- C. Unfavorable—February material price variance.
As point Fe is above the standard cost line (OP), the actual price exceeded the standard price for actual pounds used, therefore, February's material price variance is unfavorable.
- D. Unfavorable—February material usage variance.
As point Fe lies to the right of point V (standard for the actual production), actual pounds used exceeded the standard pounds allowed for actual output, therefore, February's material usage variance is unfavorable.
- E. Favorable—March material net variance.
As point Ma is below point V (standard cost for the actual production), total actual material cost is less than the standard cost allowed, therefore, March's material net variance is favorable.

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Managerial Analysis and Control

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Chapter Thirteen

Managerial Analysis and Control

DIRECT COSTING

Defined

Direct Costing, also called marginal and variable costing, is an accounting concept in which **only variable manufacturing costs are assigned to the products** manufactured. All fixed costs are excluded from the cost of the product and expensed as period costs. The fixed costs are considered to be more closely related to the ability to produce than to the actual production of goods, and therefore are considered a cost of the period rather than the product.

Comparison of Absorption Costing with Direct Costing

- Absorption Costing (conventional or full costing) requires that **all manufacturing costs be assigned to the products** manufactured either directly or indirectly by allocation; therefore, the inventories include the fixed portion of overhead costs which are excluded under direct costing. Compare the standard cost for a single product under absorption and direct costing.

		<u>Absorption</u>	<u>Direct</u>
Direct materials	2 yards @ \$1	\$ 2.00	\$ 2.00
Direct labor	2 hours @ \$4	8.00	8.00
Overhead	variable .50 per labor hr.	1.00	1.00
	fixed .75 per labor hr.	<u>1.50</u>	<u>—0—</u>
Total Standard Cost Per Unit		<u>\$12.50</u>	<u>\$11.00</u>

- Direct and absorption costing yield the same net profit when sales and production are the same.
- Direct costing yields more net profit than absorption costing when sales exceed production. The beginning inventory used during the period includes fixed cost from the prior period under absorption accounting; therefore, the costs expensed during the period are greater under absorption costing.
- Direct costing yields less net profit than absorption costing when production exceeds sales. The ending inventory includes fixed costs of the current period which are transferred to the next period under absorption costing, thereby reducing the expense of the current period.
- Direct costing is **not** acceptable for financial reporting purposes because an element of inventory cost is excluded. This can easily be corrected by adjusting the inventories and cost of goods sold to include fixed costs.
- Direct costing is **not** acceptable for tax purposes or S.E.C. reporting.

Illustrative Problem: The following sales, cost and production data relate to the only product produced by Roy Manufacturing Company:

Sales price per unit		\$ 15	
Variable manufacturing costs per unit		2	
Variable selling costs per unit		1	
Fixed manufacturing cost		1,600,000	
Fixed selling costs		400,000	
Normal production capacity		200,000	units
Actual units in year			
Production	<u>1</u>	<u>2</u>	<u>3</u>
Sales	300,000	200,000	170,000
	300,000	170,000	200,000

Required:

- a. Prepare income statement for Roy Manufacturing Co. for years 1 through 3 using the Absorption Costing method.
- b. Prepare income statements for Roy Manufacturing Co. for years 1 through 3 using the Direct Costing Method.

Solution:

a.

Absorption Costing—(000 omitted)

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
Sales (300,000 × \$15)	<u>\$4,500</u>		
(170,000 × \$15)		<u>\$2,550</u>	
(200,000 × \$15)			<u>\$3,000</u>
<i>Cost of Goods Sold:</i>			
Beginning Inventory	—0—	—0—	
(30,000 × \$10)			\$ 300
Cost of goods manufactured			
(300,000 × \$10)	\$3,000		
(200,000 × \$10)		\$2,000	
(170,000 × \$10)			\$1,700
Capacity variance		—0—	
(100,000 × \$8)	(800)		
(30,000 × \$8)			<u>240</u>
Cost of goods available for sale	<u>\$2,200</u>	<u>\$2,000</u>	<u>\$2,240</u>
Less: Ending inventory	—0—		—0—
(30,000 × \$10)		<u>\$ 300</u>	
Cost of goods sold	<u>\$2,200</u>	<u>\$1,700</u>	<u>\$2,240</u>
Gross Profit	<u>\$2,300</u>	<u>\$ 850</u>	<u>\$ 760</u>
<i>Selling Expenses:</i>			
Variable costs			
(300,000 × \$1)	300		
(170,000 × \$1)		170	
(200,000 × \$1)			200
Fixed costs	<u>400</u>	<u>400</u>	<u>400</u>
Net Income before tax	<u>\$1,600</u>	<u>\$ 280</u>	<u>\$ 160</u>

b.

Direct Costing

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
Sales (same as Absorption)	<u>\$4,500</u>	<u>\$2,550</u>	<u>\$3,000</u>
<i>Cost of Goods Sold:</i>			
Beginning inventory	—0—	—0—	
(30,000 × \$2)			\$ 60
Cost of goods manufactured			
(300,000 × \$2)	\$ 600		
(200,000 × \$2)		\$ 400	
(170,000 × \$2)			<u>\$ 340</u>
Cost of goods available for sale	<u>\$ 600</u>	<u>\$ 400</u>	<u>\$ 400</u>
Less: Ending inventory	—0—		—0—
(30,000 × \$2)		<u>\$ 60</u>	
Cost of goods sold	<u>\$ 600</u>	<u>\$ 340</u>	<u>\$ 400</u>
Contribution margin—Mfg.	<u>\$3,900</u>	<u>\$2,210</u>	<u>\$2,600</u>
Variable selling expenses	<u>300</u>	<u>170</u>	<u>200</u>
Contribution margin—final	<u>\$3,600</u>	<u>\$2,040</u>	<u>\$2,400</u>
Fixed Costs—manufacturing	1,600	1,600	1,600
selling	<u>400</u>	<u>400</u>	<u>400</u>
Net income before taxes	<u>\$1,600</u>	<u>\$ 40</u>	<u>\$ 400</u>

Note the following:

- When sales and production are equal (Year 1) the two methods provide the same net profit.
- When sales are less than production (Year 2) Absorption Costing produces higher net income than Direct Costing. This is due to the transfer of fixed cost from the current year to the next under Absorption Costing. In Year #2, \$240,000 of fixed cost is transferred to Year #3 in the ending inventory. (30,000 units × \$8 FC per unit)
- When sales are greater than production (Year 3) Direct Costing produces higher net income than Absorption Costing. Again, the difference is due to the transfer of fixed cost in Absorption Costing. \$240,000 of fixed cost was transferred into Year #3 in the beginning inventory.
- In Direct Costing, net income follows sales. Note the increase in profit from Year 2 to Year 3 as sales increase.
- In Absorption Costing, net income may or may not follow sales. Note the decrease in net income from Year 2 to Year 3 as sales increase. This, again, is caused by the transfer of fixed costs. It may be analyzed as follows:

Increase in revenue	30,000 units × \$15	\$450,000
Less: Increase in variable cost—mfg.	30,000 units × \$ 2	60,000
Increase variable cost—selling	30,000 units × \$ 1	<u>30,000</u>
Increased contribution in Year 3		\$360,000
Difference in Fixed Cost from Year 2 to 3		
Decrease in Year 2 FC	240,000	
Increase in Year 3 FC	<u>240,000</u>	
Total difference in FC		<u>\$480,000</u>
Change in net income		(\$120,000)

Arguments for Using Direct Costing

- Reports are easier for management to interpret because the statements emphasize contribution margin which is the excess of selling price over variable costs.
- Direct costing emphasizes the cost-volume-profit relationships and facilitates its analysis.
- Other things remaining constant, profits move in the same direction as sales when direct costing is used, as profit is not affected by changes in the absorption of fixed costs resulting from increases or decreases in inventory. Under absorption costing, an increase in sales may result in an increase or decrease in profit as fixed costs are transferred from period to period. A decrease in sales may also result in an increase or decrease in profit under absorption costing.
- Permits a more uniform and direct evaluation of product lines, sales areas, classes of customers because of the absence of fixed cost allocation.
- The effect of fixed costs on income is emphasized by the inclusion of all such costs on the income statement.
- Because it is simpler, clerical costs are lower.

Arguments Against Using Direct Costing

- Exclusion of fixed costs from inventory might adversely affect management decisions about pricing by emphasizing the short term aspects of the problem—(capacity, variable costs and contribution to fixed cost recovery).
- Direct costing is not acceptable for financial reporting, tax or S.E.C. purposes.
- Separation of costs into fixed and variable categories may be very difficult.

COST-VOLUME-PROFIT RELATIONSHIPS (ANALYSIS)

Frequently referred to as break-even analysis. CVP analysis stresses the relationships between the factors which affect profit, and serves as a basis for profit planning by management.

Break-even Analysis

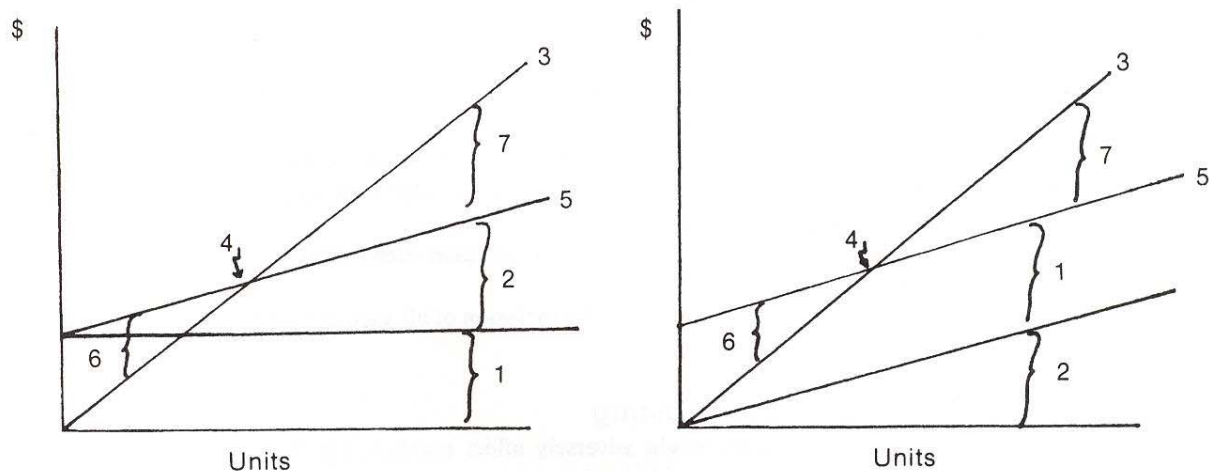
- **Fixed Costs**—Costs which remain constant **in total** regardless of changes in the level of activity. Therefore, the per unit cost changes with changes in the level of operations.
- **Variable Costs**—Costs which vary in total directly with changes in the level of activity. The cost per unit is constant at different levels of activity.
- **Relevant Range**—The limits within which the level of activity may vary and the above cost-volume relationships will remain valid.
- **Contribution Margin**—Selling price less variable cost.
- **Break-even Point**—The level of operations at which there is no profit and no loss. Determined as follows:

$$(a) \text{ B.E.P. (units) = } \frac{\text{Fixed Cost}}{\text{Contribution Margin}}$$

$$(b) \text{ B.E.P. ($) = } \frac{\text{Fixed Cost}}{1 - \text{VC/SP}} \quad \text{OR} \quad \frac{\text{Fixed Cost}}{\text{CM/SP}} \quad \text{Fixed cost divided by the contribution margin ratio.}$$

- **Margin of Safety**—The excess of actual or budgeted sales over sales at the break-even point. It reveals the amount by which sales could decrease before losses occur.

- **Break-even Chart**—Graphical representation of the C.V.P. relationships.



- Key:
1. Fixed cost
 2. Variable cost
 3. Total revenue line
 4. Break-even point
 5. Total cost line
 6. Loss area (line 5 vs. line 3)
 7. Profit area (line 3 vs. line 5)

Examples of Break-even Computations—Assume the following:

Selling price per unit	\$2.00
Variable cost per unit	\$1.40
Fixed Costs per year	\$12,000
Tax rate	40%

$$\bullet \text{ B.E.P. (units)} = \frac{FC}{CM} = \frac{\$12,000}{\$2.00 - 1.40} = \frac{\$12,000}{\$0.60} = \underline{20,000} \text{ units}$$

$$\bullet \text{ B.E.P. ($) = } \frac{FC}{CM\%} = \frac{\$12,000}{\frac{.60}{2.00}} = \frac{12,000}{.30} = \underline{40,000} \text{ sales}$$

Or $20,000 \text{ units} \times \$2.00 = \underline{\$40,000}$

Break-even analysis may be extended to determine the number of units or dollar sales required to earn or maintain certain profit before or after tax. Continuing the above example:

- Volume required to produce a net income of \$9,000 before income taxes.

$$\# \text{ units} = \frac{FC + \text{NIBT}}{CM} = \frac{\$12,000 + 9,000}{.60} = \underline{35,000} \text{ units}$$

$$\$ \text{ sales} = \frac{FC + \text{NIBT}}{CM\%} = \frac{\$12,000 + 9,000}{.30} = \underline{70,000}$$

Margin of safety $\$70,000 - \$40,000 = \underline{\$30,000}$

- Volume required to produce a net income of \$9,000 after taxes.

$$\frac{FC + \frac{NIAT}{1-TR}}{CM} = \frac{\$12,000 + \frac{\$9,000}{1-.4}}{.60} = \frac{\$12,000 + \$15,000}{.60} = \underline{45,000 \text{ units}}$$

Margin of safety $(\$2 \times 45,000) - \$40,000 = \underline{\$50,000}$

- Assume labor negotiations are underway that will increase variable costs by 20%. How many units will the company have to sell to maintain a net income of \$9,000 before taxes?

Selling Price	\$2.00
Variable cost ($\$1.40 \times 1.20$)	<u>1.68</u>
Contribution margin	\$.32

$$\# \text{ units} = \frac{FC + NIBT}{CM} = \frac{\$12,000 + \$9,000}{\$.32} = \underline{65,625 \text{ units}}$$

Calculate the margin of safety. (Answer: \$56,250)

Incremental Analysis (Relevant Costing)

The concepts of C.V.P. Analysis (particularly contribution margin) may also be used to evaluate the effects of proposed changes or alternatives on profitability and the level of operations. In the application of C.V.P. concepts the candidate must be able to identify for analysis the relevant quantitative information, which varies depending on the nature of the problem. Historic amounts or amounts which do **not** change are irrelevant in decision making. The relevant amounts are the future, differential amounts (incremental analysis), the amounts which are different or change in the future depending on which alternative is selected.

Illustrative Problem

1. Able Company operates at 90% of plant capacity, producing 90,000 units of product. The total cost of manufacturing 90,000 units is \$76,500 (VC = \$49,500, FC = \$27,000), resulting in a cost per unit of \$.85. Recently, a large customer, who purchases 15,000 units per year, canceled his orders for the following year. Rather than operate at 75% of capacity, the company is seeking new customers. A potential customer, Buy-More Co. has offered to purchase 20,000 units at \$.65 per unit. Should Abel Co. accept this special order?

Solution:	Selling Price	\$.65
	Variable Cost	<u>.55</u> ($\$49,500 \div 90,000$)
	C.M.	<u>\$.10</u>

Yes. It makes a contribution to the recovery of F.C. and profit.

2. Referring to problem 1, if a second customer, Could-Be Co. is willing to buy 12,000 units at \$.75 per unit, which order should be accepted?

Answer: "Could-Be" resulting in \$400 additional contribution. (12,000 @ \$.20 CM vs. 20,000 @ \$.10 CM)

3. Zelta Co. manufactures a single product which it sells to other manufacturers for further processing and sale to ultimate consumers. The unit selling price and unit cost data for present production of 100,000 units per year are as follows:

Selling Price		\$7.00
Direct Materials	\$1.15	
Direct Labor	1.80	
Variable OH	1.15	
Fixed OH	.80	
Variable selling expense	.85	
Fixed selling expense	<u>.35</u>	<u>6.10</u>
Profit per unit B.T.		<u>\$.90</u>

Zelta Co. is considering performing the required further processing itself and selling the product to the ultimate consumer. Additional processing requires no special facilities. The unit selling price and cost data of the further processing are estimated to be:

Selling price per unit	\$8.50
Direct labor per unit	.70
Variable overhead per unit	.20
Variable selling expense per unit	.10
Fixed overhead per year	15,000
Fixed selling expense per year	10,000

Should Zelta perform the further processing?

Answer: Yes, \$50,000 added profit. The fixed overhead and selling expenses are not incremental costs but rather reallocations of existing costs. Note that no additional facilities were required for the additional processing. Incremental revenue is \$1.50 (\$8.50 - \$7.00) and incremental costs are \$1.00 (\$.70 + \$.20 + \$.10). The incremental contribution margin is \$.50 per unit or \$50,000 total.

Assumptions Which Underlie C.V.P. Analysis

1. Costs which can be classified as either fixed or variable.
2. Variable costs change at a linear rate.
3. Fixed costs remain unchanged over the relevant range.
4. Selling price does not change as the physical sales volume changes.
5. There is only a single product, or the sales mix remains constant.
6. Productive efficiency does not change.
7. Inventories are either kept constant or are zero.
8. Volume is the only relevant factor affecting cost.
9. There is a relevant range of validity for all of the underlying assumptions and concepts.

PROBABILITY

Probability is the mathematical representation of the likelihood that a particular event will occur. It may be expressed in the form of a percentage, a fraction or a decimal. For example, the probability that heads will result on the flip of a fair coin is 50% (1/2 or .5). The probabilities of the various possible occurrences are collectively called the probability distribution, which totals 100% or 1.0.

Probability distributions may be either objective or subjective. Objective probability distributions are established by the application of statistical procedures to empirical evidence. Examples would include the probability distributions associated with the flip of a fair coin or the rolling of fair dice. Subjective probability distributions are those which cannot be established by the application of statistical procedures but rather are the result of subjective estimation by knowledgeable persons; for example, the probability distribution associated with the likelihood of Congress passing a specific bill.

It is important that a candidate be familiar with the terminology and basic application of probability theory. Specifically, the candidate should have a working knowledge of the following:

- Probability distribution
- Payoff tables
- Expected profit
- Value of perfect information
- Regret tables
- Expected loss

These points may best be explained and illustrated by use of an example.

Assume that a specialty food store stocks a perishable item which costs \$3 per case and sells for \$7 per case. If the item is not sold during the first day it is offered for sale, it must be destroyed. Analysis of the sales records for the past 80 days shows that there has been no trend in the sales for this item.

Sales of the item during this period were as follows:

<u>Cases sold per day</u>	<u>Number of days</u>
5	8
6	16
7	32
8	24

Probability Distribution

The probability that a particular event will occur may be determined as the ratio of the number of times the event occurs in observations to the total observations. The probability distribution (objective) for the example is shown below.

<u>Sales</u>	<u>Observations</u>	<u>Probability</u>
5	8	$8/80 = 10\% = .1$
6	16	$16/80 = 20\% = .2$
7	32	$32/80 = 40\% = .4$
8	<u>24</u>	$24/80 = 30\% = .3$
	<u>80</u>	<u>$80/80 = 100\% = 1.0$</u>

Payoff Table (Conditional Profits Table)

The payoff table shows the profit from any possible combination of available alternative actions and potential event occurrences. Each value in the table is conditional on an action being taken and a particular event occurring. The payoff table for the example is as follows:

		Payoff Table			
<u>Alternative Inventory Actions</u>					
<u>Possible Demand</u>		<u>5 cases</u>	<u>6 cases</u>	<u>7 cases</u>	<u>8 cases</u>
5 cases		\$20a	\$17b	\$14	\$11
6 cases		20	24	21	18
7 cases		20	24	28	25
8 cases		20	24	28	32

(a) profit per case = \$7 selling price – \$3 cost = \$4 profit for sales of 5 cases = $5 \times \$4 = \underline{\$20}$

(b) loss per case unsold = \$3 cost, profit from sale of 5 cases less loss for 1 case = $\$20 - 3 = \underline{\$17}$

Expected Profit

The expected profit for an alternative action is obtained by weighting the conditional profit of each possible outcome of the alternative by the probability of its occurrence and totaling the results. The expected daily profit resulting from stocking 8 cases in the example would be determined as follows:

Expected Profit from Stocking 8 Cases

<i>Demand</i>	<i>Conditional Profit</i>	×	<i>Probability of Demand</i>	=	<i>Expected Profit</i>
5	\$11		.10		\$ 1.10
6	18		.20		3.60
7	25		.40		10.00
8	32		<u>.30</u>		<u>9.60</u>
			1.00		<u>\$24.30</u>

The expected daily profits for the alternative stock action of the example are:

<i>Cases Stocked</i>	<i>Expected Profits</i>
5	\$20.00
6	23.30
7	25.20
8	24.30

The optimum inventory action would be for the store to stock 7 cases as this alternative yields the greatest expected profit.

Value of Perfect Information

To determine the value of perfect information it is first necessary to compute the expected profit with perfect information. Obviously, if the outcome of an event were known prior to its occurrence, the alternative action which provided the greatest profit for that outcome would be selected as the course of action. The expected profit with perfect information for the example is computed below.

Expected Profit with Perfect Information

<i>Demand</i>	<i>Cases Stocked</i>	<i>Conditional Profit</i>	×	<i>Probability of Demand</i>	=	<i>Expected Profit</i>
5	5	\$20		.1		\$ 2.00
6	6	24		.2		4.80
7	7	28		.4		11.20
8	8	32		<u>.3</u>		<u>9.60</u>
				1.00		<u>\$27.60</u>

The value of perfect information may now be determined as the difference between the expected profit with perfect information and the expected profit of the optimum action without perfect information. For the example, this would be \$2.40 (\$27.60 – \$25.20). To pay more than this amount, the store would be losing the advantage to be gained with the perfect information.

Regret Table (Conditional Loss Table)

The regret table shows the losses from any possible combination of available alternative actions and potential event occurrences. There are two types of losses which may occur: (a) Opportunity losses which are the losses of profit from inability to meet demand, and (b) obsolescence losses which are the losses from declining values of excess stock. Each value in the table is conditional on an action being taken and a particular event occurring. The regret table for the example appears below.

Regret Table
Alternative Inventory Actions

<u>Demand</u>	<u>5 Cases</u>	<u>6 Cases</u>	<u>7 Cases</u>	<u>8 Cases</u>
5	\$0	\$3b	\$6	\$9
6	4a	0	3	6
7	8	4	0	3
8	12	8	4	0

- (a) if 5 cases are stocked and demand is 6 cases, the profit on sales of 1 case or \$4 has been lost (opportunity loss)
- (b) If 6 cases are stocked and demand is 5 cases, the cost of 1 case or \$3 will be lost as spoilage (obsolescence loss)

Expected Loss

The expected loss for an alternative action is determined in the same manner as the expected profit. For the example, the expected daily loss from stocking 8 cases is computed below.

Expected Loss from Stocking 8 Cases

<u>Demand</u>	<u>Conditional Loss</u>	×	<u>Probability of Demand</u>	=	<u>Expected Loss</u>
5	\$9		.1		\$.90
6	6		.2		1.20
7	3		.4		1.20
8	0		<u>.3</u>		<u>0.00</u>
			1.00		<u>\$3.30</u>

The expected daily loss for the alternative stock actions are:

<u>Cases Stocked</u>	<u>Expected Loss</u>
5	\$7.60
6	4.30
7	2.40
8	3.30

The optimum inventory action is the one which minimizes the expected loss and is the same as when expected profits were used for the selection of the optimum inventory action.

Note that the expected loss plus the expected profit computed earlier is equal to the expected profit with perfect information, and that the expected loss of the optimum solution is equal to the value of the perfect information.

Illustrative Problem

Commercial Products Corp., an audit client, requests your assistance in determining the potential loss on a binding purchase contract which will be in effect at the end of the corporation's fiscal year. The corporation produces a chemical compound which deteriorates and must be discarded if it is not sold by the end of the month during which it is produced.

The total variable cost of the manufactured compound is \$25 per unit and it is sold for \$40 per unit. The compound can be purchased from a vertically integrated competitor at \$40 per unit plus \$5 freight per unit. It is estimated that failure to fill orders would result in the complete loss of 8 out of 10 customers placing orders for the compound.

The corporation has sold the compound for the past 30 months. Demand has been irregular and there is no sales trend. During this period, sales per month have been:

<u>Units Sold per Month</u>	<u>Number of Months*</u>	
4,000	6	
5,000	15	*Occurred in random
6,000	9	sequence

Required: For each of the following, prepare a schedule (with supporting computations in good form) of the

- Probability of sales of 4,000, 5,000 or 6,000 units in any month.
- Marginal income if sales of 4,000, 5,000 or 6,000 units are made in one month and 4,000, 5,000 or 6,000 units are manufactured for sale in the same month. Assume all sales orders are filled. (Such a schedule is sometimes called a "payoff table".)
- Average monthly marginal income the corporation should expect over the long run if 5,000 units are manufactured every month and all sales orders are filled.

Solution:

1.

Commercial Products Corp.
Schedule Computing the Probability of Unit Sales per Month

<u>Unit Sales per Month</u>	<u>No. of Months</u>	<u>Probability</u>
4,000	6	6/30 = .2
5,000	15	15/30 = .5
6,000	<u>9</u>	9/30 = <u>.3</u>
	<u>30</u>	<u>1.0</u>

2.

Schedule of Marginal Income
For Various Combinations of Unit Sales and Units Manufactured

<u>Units Manufactured (and Purchased)</u>			
<u>Unit Sales</u>	<u>4,000</u>	<u>5,000</u>	<u>6,000</u>
4,000	\$60,000 (1)	\$35,000 (2)	\$10,000 (2)
5,000	55,000 (3)	75,000 (1)	50,000 (2)
6,000	50,000 (3)	70,000 (3)	90,000 (1)

Notes:

Computation of Marginal Income

(1) When all units manufactured are sold:

$$4,000 \times (\$40 - 25) = \$60,000$$

$$5,000 \times (\$40 - 25) = 75,000$$

$$6,000 \times (\$40 - 25) = 90,000$$

(2) Reduction per 1,000 units when more units are manufactured than are sold:

$$1,000 \times \$25 = \$25,000$$

(3) Reduction per 1,000 units when units must be purchased to fill sales orders:

$$1,000 \times (\$40 - [\$40 + \$5]) = \$5,000$$

3.

**Schedule Computing Expected Marginal Income if 5,000 Units
are Manufactured and All Sales Orders are Filled**

<u>Unit Sales</u>	<u>Probability</u>	<u>Marginal Income</u>	<u>Expected Value</u>
4,000	.2	\$35,000	\$ 7,000
5,000	.5	75,000	37,500
6,000	.3	70,000	<u>21,000</u>
Expected average monthly MI			<u><u>\$65,500</u></u>

REGRESSION ANALYSIS

Regression analysis is a mathematical technique used to predict the value of one variable and its changes (the dependent variable) based upon the value of some other variable (the independent variable). When the independent variable is a function of time such as months, quarters, or years, then the term "time regression", "time trend", or "time series" analysis is sometimes used. Simple regression analysis involves the use of only one independent (explanatory) variable, while multiple regression analysis allows for more than one independent variable. Regression analysis may be used to predict future sales, revenues, profits, demands, costs, etc. or to separate a semi-variable item into its fixed and variable components.

Methods of Measuring Relationships Between Variables:

1. **High-Low Method:** Only two observations of the variables are used to measure the relationship between them. The values of the variables are measured at a high and low level of the independent variable, and the change in the dependent variable is divided by the change in the independent variable to determine its relationship to the independent variable. The fixed portion or minimum level of the dependent variable can be determined by deducting from its total value (at the high or low observation) its value determined in relation to the independent variable (at that same observation). The observations should be within the relevant range for the variables, and be representative of normal results at these levels.

The High-Low Method has the advantage of being easy and inexpensive to use; however, it has the disadvantage of being the least accurate of the methods as it uses only two observations and these may not be representative of the relationship between the variables.

Example:

<u>Observations</u>	<u>Direct Labor Hours</u>	<u>Cost of Utilities</u>
High	2800	\$1334
Low	<u>1300</u>	<u>884</u>
Change	1500	\$ 450

Relationship $\$450 \div 1500 = \0.30 per direct labor hour

Determination of fixed portion:

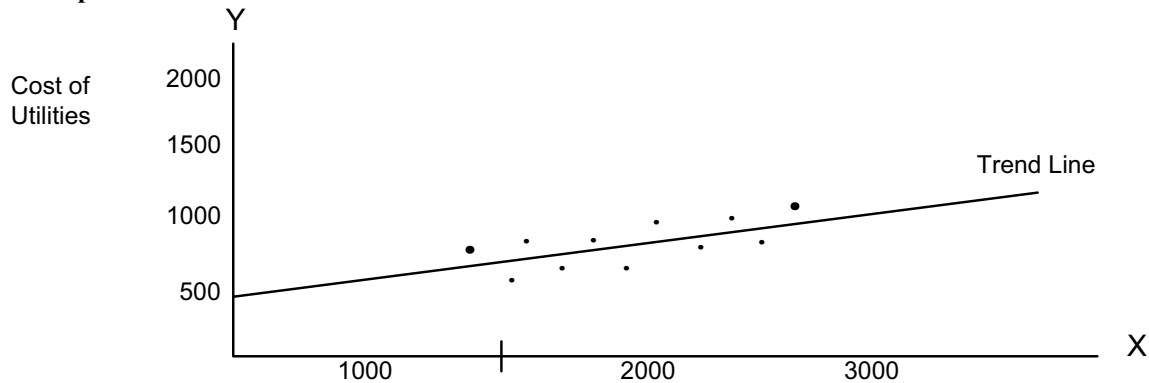
	<u>High</u>	<u>Low</u>
Total Utilities Cost	\$1334	\$884
Cost based on direct labor hours (\$.30 per)	<u>840</u>	<u>390</u>
Fixed portion	\$ 494	\$494

Predicted Utilities Cost at 2000 direct labor hours:
 $\$494 + (\$.30 \times 2000) = \$494 + \$600 = \$1094$

2. **Scattergraph Method:** Multiple observations of the two variables are plotted on a graph in order to visually determine their relationship. The values of the dependent variable are plotted on the Y axis (vertical axis) and those of the independent variable on the X axis (horizontal axis). Each point on the graph represents an observation of the variables (X and Y). A straight line (Trend Line) is then drawn through the plotted points so that there is an equal distance between the Trend Line and the plotted points above and below the line. The Trend Line is then used to describe the relationship between the variables and to predict the value of the dependent variable for given values of the independent variable. The point at which the trend line intersects the Y axis indicates the fixed portion or minimum value of the dependent variable. If the plotted points on the scattergraph follow a generally straight line, a linear relationship is assumed to exist, and the variables are said to be correlated with each other.

The Scattergraph Method has the advantage of being relatively simple to apply and understand; however, it is not objective as personal bias may distort the fitting of the trend line.

Example:



Fixed portion is \$500 (intercept of the Y axis)

The variable relationship is indicated by the slope of the trend line.

3. **Regression (Least Squares) Analysis:** A Regression Line is a mathematically fitted line to the observations of the variables which were plotted in the scattergraph. The least squares method fits the line to the observations so that the sum of the squared variances of the observations above and below the line are minimized. The regression line is to the scattergraph as an average is to a list of values; it indicates the average value of the dependent variable (y) associated with a particular value of the independent variable (x). The method assumes a linear relationship and is based upon the formula for a straight line, $Y = a + bx$, where Y = the independent variable; a = the fixed portion or minimum value of the independent variable; b = the slope of the line or the rate of variability in the dependent variable for changes in the independent variable; and x = the value of the independent variable. The method has the advantage of being more objective and accurate; however, it is time-consuming if done manually.

Multiple regression analysis is a further expansion of the least squares method, allowing for the consideration of more than one independent variable. The formula could appear as $Y = a + bx + cz$, where c is the rate of variability for z, an additional independent variable.

Correlation: The statistical measure of the relationship of dependent and independent variables is the Coefficient of Correlation (r). If perfect correlation exists all points (observations) lie on the regression line, and the coefficient of correlation would be +1 or -1, depending upon whether they are directly (positively) or inversely (negatively) related. If no correlation exists the coefficient would be 0, indicating that there is no statistical relationship between the variables.

The Coefficient of Determination (r^2) is the statistical measure of the fit of the regression line to the observations of the variables, and is found by squaring the coefficient of correlation. A coefficient of determination of .94 would mean that 94% of the change in the dependent variable (y) is related to the change in the independent variable (x).

Chapter Thirteen

Managerial Analysis and Control Questions

DIRECT COSTING, C.V.P. RELATIONSHIPS

Items 1 through 5 are based on the following information:

The following data relate to a year's budgeted activity for Patsy Corporation, a single product company:

	<u>Units</u>
Beginning inventory	30,000
Production	<u>120,000</u>
Available	150,000
Sales	<u>110,000</u>
Ending inventory	<u>40,000</u>
	<u>Per Unit</u>
Selling price	\$5.00
Variable manufacturing costs	1.00
Variable selling costs	2.00
Fixed manufacturing costs (based on 100,000 units)	.25
Fixed selling costs (based on 100,000 units)	.65

Total fixed costs remain unchanged within the relevant range of 25,000 units to total capacity of 160,000 units.

1. The projected annual breakeven sales in units for Patsy Corporation is

- 30,000.
- 37,143.
- 45,000.
- 50,000.

2. The projected net income for Patsy Corporation for the year under direct (variable) costing is

- \$110,000.
- \$127,500.
- \$130,000.
- \$150,000.

3. If all the variances are charged to cost of goods sold, the projected net income for Patsy Corporation for the year under absorption costing is

- \$122,500.
- \$127,500.
- \$130,000.
- \$132,500.

4. A special order is received to purchase 10,000 units to be used in an unrelated market. Given the original data, what price per unit should be charged on this order to increase Patsy Corporation's net income by \$5,000?

- \$3.50.
- \$4.40.
- \$5.00.
- \$6.50.

5. Concerning the data for Patsy Corporation, assume selling price increases by 20%; variable manufacturing costs increase by 10%; variable selling costs remain the same; and total fixed costs increase to \$104,400. How many units must now be sold to generate a profit equal to 10% of the contribution margin?

- 36,000.
- 40,000.
- 43,320.
- 45,390.

6. Kent Co.'s 1985 operating percentages were as follows:

Sales		100%
Cost of sales		
Variable	50%	
Fixed	<u>10</u>	<u>60</u>
Gross profit		40
Other operating expenses		
Variable	20	
Fixed	<u>15</u>	<u>35</u>
Operating income		<u>5%</u>

Kent's 1985 sales totaled \$2,000,000. At what 1985 sales level would Kent break even?

- \$1,900,000
- \$1,666,667
- \$1,250,000
- \$833,333

7. Jago Co. has 2 products that use the same manufacturing facilities and cannot be subcontracted. Each product has sufficient orders to utilize the entire manufacturing capacity. For short-run profit maximization, Jago should manufacture the product with the

- a. Lower total manufacturing costs for the manufacturing capacity.
- b. Lower total variable manufacturing costs for the manufacturing capacity.
- c. Greater gross profit per hour of manufacturing capacity.
- d. Greater contribution margin per hour of manufacturing capacity.



- a. I
- b. II
- c. III
- d. IV

8. The following information pertains to Mete Co.:

Sales	\$400,000
Variable costs	80,000
Fixed costs	20,000

Mete's breakeven point in sales dollars is

- a. \$20,000
- b. \$25,000
- c. \$80,000
- d. \$100,000

9. In an income statement prepared as an internal report using the direct (variable) costing method, fixed selling and administrative expenses would

- a. Be used in the computation of the contribution margin.
- b. Be used in the computation of operating income but **not** in the computation of the contribution margin.
- c. Be treated the same as variable selling and administrative expenses.
- d. Not be used.

10. At the end of Killo Co.'s first year of operations, 1,000 units of inventory remained on hand. Variable and fixed manufacturing costs per unit were \$90 and \$20, respectively. If Killo uses absorption costing rather than direct (variable) costing, the result would be a higher pretax income of

- a. \$0
- b. \$20,000
- c. \$70,000
- d. \$90,000

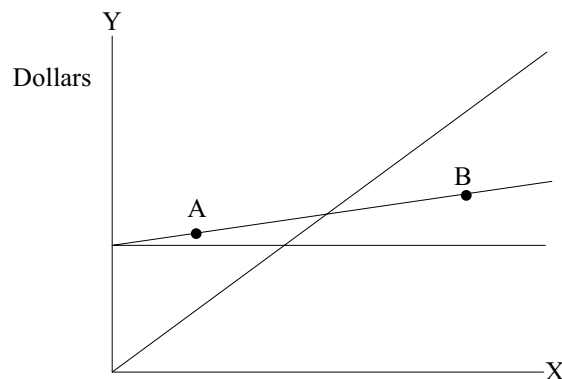
11. Quo Co. rented a building to Hava Fast Food. Each month Quo receives a fixed rental amount plus a variable rental amount based on Hava's sales for that month. As sales increase so does the variable rental amount, but at a reduced rate. Which of the following curves reflects the monthly rentals under the agreement?

12. A single-product company prepares income statements using both absorption and variable costing methods. Manufacturing overhead cost applied per unit produced in 1990 was the same as in 1989. The 1990 variable costing statement reported a profit whereas the 1990 absorption costing statement reported a loss. The difference in reported income could be explained by units produced in 1990 being

- a. Less than units sold in 1990.
- b. Less than the activity level used for allocating overhead to the product.
- c. In excess of the activity level used for allocating overhead to the product.
- d. In excess of units sold in 1990.

Item 13 is based on the following:

The diagram below is a cost-volume-profit chart.



13. At point A compared to point B, as a percentage of sales revenues

- | | | |
|----|---------------------------|------------------------|
| | <u>Variable costs are</u> | <u>Fixed costs are</u> |
| a. | Greater | Greater |
| b. | Greater | The same |
| c. | The same | The same |
| d. | The same | Greater |

14. The most likely strategy to reduce the breakeven point would be to
- Increase both the fixed costs and the contribution margin.
 - Decrease both the fixed costs and the contribution margin.
 - Decrease the fixed costs and increase the contribution margin.
 - Increase the fixed costs and decrease the contribution margin.

15. Buff Co. is considering replacing an old machine with a new machine. Which of the following items is economically relevant to Buff's decision? (Ignore income tax considerations.)

	<u>Carrying amount of old machine</u>	<u>Disposal value of new machine</u>
a.	Yes	No
b.	No	Yes
c.	No	No
d.	Yes	Yes

16. The Lantern Corporation has 1,000 obsolete lanterns that are carried in inventory at a manufacturing cost of \$20,000. If the lanterns are remachined for \$5,000, they could be sold for \$9,000. If the lanterns are scrapped, they could be sold for \$1,000. What alternative is more desirable and what are the total relevant costs for that alternative?
- Remachine and \$5,000.
 - Remachine and \$25,000.
 - Scrap and \$20,000.
 - Neither, as there is an overall loss under either alternative.

17. Jarvis Co. has fixed costs of \$200,000. It has two products that it can sell, Tetra and Min. Jarvis sells these products at a rate of 2 units of Tetra to 1 unit of Min. The contribution margin is \$1 per unit for Tetra and \$2 per unit for Min. How many units of Min would be sold at the breakeven point?
- 44,444.
 - 50,000.
 - 88,888.
 - 100,000.

Items 18 and 19 are based on the following information:

Taylor, Inc., produces only two products, Acdom and Belnom. These account for 60% and 40% of the total sales dollars of Taylor, respectively. Variable costs (as a percentage of sales dollars) are 60% for Acdom and 85% for Belnom. Total fixed costs are \$150,000. There are no other costs.

18. What is Taylor's breakeven point in sales dollars?
- \$150,000.
 - \$214,286.
 - \$300,000.
 - \$500,000.

19. Assuming that the total fixed costs of Taylor increase by 30%, what amount of sales dollars would be necessary to generate a net income of \$9,000?
- \$204,000.
 - \$464,000.
 - \$659,000.
 - \$680,000.

20. Thomas Company sells products X, Y, and Z. Thomas sells three units of X for each unit of Z, and two units of Y for each unit of X. The contribution margins are \$1.00 per unit of X, \$1.50 per unit of Y, and \$3.00 per unit of Z. Fixed costs are \$600,000. How many units of X would Thomas sell at the breakeven point?
- 40,000.
 - 120,000.
 - 360,000.
 - 400,000.

21. In an income statement prepared using the variable costing method, fixed factory overhead would
- Not be used.
 - Be used in the computation of the contribution margin.
 - Be used in the computation of operating income but **not** in the computation of the contribution margin.
 - Be treated the same as variable factory overhead.

22. Cuff Caterers quotes a price of \$60 per person for a dinner party. This price includes the 6% sales tax and the 15% service charge. Sales tax is computed on the food plus the service charge. The service charge is computed on the food only. At what amount does Cuff price the food?

- a. \$56.40
- b. \$51.00
- c. \$49.22
- d. \$47.40

23. Cardinal Company needs 20,000 units of a certain part to use in its production cycle. The following information is available:

Cost to Cardinal to make the part:

Direct materials	\$ 4
Direct labor	16
Variable overhead	8
Fixed overhead applied	<u>10</u>
	<u>\$38</u>

Cost to buy the part from the Oriole Company	<u>\$36</u>
--	-------------

If Cardinal buys the part from Oriole instead of making it, Cardinal could not use the released facilities in another manufacturing activity. 60% of the fixed overhead applied will continue regardless of what decision is made.

In deciding whether to make or buy the part, the total relevant costs to make the part are

- a. \$560,000.
- b. \$640,000.
- c. \$720,000.
- d. \$760,000.

24. Product Cott has sales of \$200,000, a contribution margin of 20%, and a margin of safety of \$80,000. What is Cott's fixed cost?

- a. \$16,000
- b. \$24,000
- c. \$80,000
- d. \$96,000

25. In an income statement prepared as an internal report using the variable costing method, which of the following terms should appear?

	<i>Gross profit (margin)</i>	<i>Operating income</i>
a.	Yes	Yes
b.	Yes	No
c.	No	No
d.	No	Yes

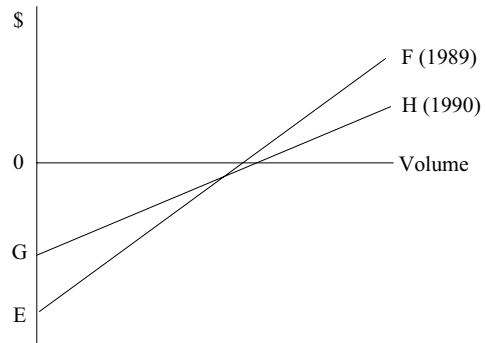
26. The following information pertains to Sisk Co.:

Sales (25,000 units)	\$500,000
Direct materials and direct labor	150,000
Factory overhead:	
Variable	20,000
Fixed	35,000
Selling and general expenses:	
Variable	5,000
Fixed	30,000

Sisk's breakeven point in number of units is

- a. 4,924
- b. 5,000
- c. 6,250
- d. 9,286

27. In the profit-volume chart below, EF and GH represent the profit-volume graphs of a single-product company for 1989 and 1990, respectively.



If 1989 and 1990 unit sales prices are identical, how did total fixed costs and unit variable costs of 1990 change compared to 1989?

	<i>1990 total fixed costs</i>	<i>1990 unit variable costs</i>
a.	Decreased	Increased
b.	Decreased	Decreased
c.	Increased	Increased
d.	Increased	Decreased

28. Using the variable costing method, which of the following costs are assigned to inventory.?

	<i>Variable selling and administrative costs</i>	<i>Variable factory overhead costs</i>
a.	Yes	Yes
b.	Yes	No
c.	No	No
d.	No	Yes

29. Motor Company manufactures 10,000 units of Part M-1 for use in its production annually. The following costs are reported:

Direct materials	\$ 20,000
Direct labor	55,000
Variable overhead	45,000
Fixed overhead	<u>70,000</u>
	<u>\$190,000</u>

Valve Company has offered to sell Motor 10,000 units of Part M-1 for \$18 per unit. If Motor accepts the offer, some of the facilities presently used to manufacture Part M-1 could be rented to a third party at an annual rental of \$15,000. Additionally, \$4 per unit of the fixed overhead applied to Part M-1 would be totally eliminated. Should Motor accept Valve's offer, and why?

- No, because it would be \$5,000 cheaper to make the part.
- Yes, because it would be \$10,000 cheaper to buy the part.
- No, because it would be \$15,000 cheaper to make the part.
- Yes, because it would be \$25,000 cheaper to buy the part.

30. In an income statement prepared as an internal report using the absorption costing method, which of the following terms should appear?

	<i>Contribution margin</i>	<i>Gross profit (margin)</i>
a.	No	Yes
b.	No	No
c.	Yes	No
d.	Yes	Yes

31. The following information pertains to Clove Co. for the year ending December 31, 1992:

Budgeted sales	\$1,000,000
Breakeven sales	700,000
Budgeted contribution margin	600,000
Cashflow breakeven	200,000

Clove's margin of safety is

- \$300,000
- \$400,000
- \$500,000
- \$800,000

Items 32 and 33 are based on the following information:

Selected information concerning the operations of Kern Company for the year ended December 31, 19X1, is available as follows:

Units produced	10,000
Units sold	9,000
Direct materials used	\$40,000
Direct labor incurred	\$20,000
Fixed factory overhead	\$25,000
Variable factory overhead	\$12,000
Fixed selling and administrative expenses	\$30,000
Variable selling and administrative expenses	\$ 4,500
Finished goods inventory, Jan. 1, 19X1	None

There were no work-in-process inventories at the beginning and end of 19X1.

32. What would be Kern's finished goods inventory cost at December 31, 19X1, under the variable (direct) cost method?

- \$7,200.
- \$7,650.
- \$8,000.
- \$9,700.

33. Which costing method, absorption or variable costing, would show a higher operating income for 19X1 and by what amount?

	<i>Costing method</i>	<i>Amount</i>
a.	Absorption costing	\$2,500
b.	Variable costing	\$2,500
c.	Absorption costing	\$5,500
d.	Variable costing	\$5,500

34. Jordan Company budgeted sales of 400,000 calculators at \$40 per unit for 19X2. Variable manufacturing costs were budgeted at \$16 per unit, and fixed manufacturing costs at \$10 per unit. A special order offering to buy 40,000 calculators for \$23 each was received by Jordan in March 19X2. Jordan has sufficient plant capacity to manufacture the additional quantity; however, the production would have to be done on an overtime basis at an estimated additional cost of \$3 per calculator. Acceptance of the special order would not affect Jordan's normal sales and no selling expenses would be incurred. What would be the effect on operating profit if the special order were accepted?

- a. \$120,000 decrease.
- b. \$160,000 increase.
- c. \$240,000 decrease.
- d. \$280,000 increase.

35. Del Co. has fixed costs of \$100,000 and breakeven sales of \$800,000. What is its projected profit at \$1,200,000 sales?

- a. \$50,000
- b. \$150,000
- c. \$200,000
- d. \$400,000

36. Manor Company plans to discontinue a department with a contribution to overhead of \$24,000 and allocated overhead of \$48,000, of which \$21,000 cannot be eliminated. The effect of this discontinuance on Manor's pretax profit would be a (an)

- a. Decrease of \$3,000.
- b. Increase of \$3,000.
- c. Decrease of \$24,000.
- d. Increase of \$24,000.

37. Gandy Company has 5,000 obsolete desk lamps that are carried in inventory at a manufacturing cost of \$50,000. If the lamps are reworked for \$20,000, they could be sold for \$35,000. Alternatively, the lamps could be sold for \$8,000 to a jobber located in a distant city. In a decision model analyzing these alternatives, the sunk cost would be

- a. \$ 8,000.
- b. \$15,000.
- c. \$20,000.
- d. \$50,000.

38. On January 1, 1992, Lake Co. increased its direct labor wage rates. All other budgeted costs and revenues were unchanged. How did this increase affect Lake's budgeted break-even point and budgeted margin of safety?

	<u>Budgeted break-even point</u>	<u>Budgeted margin of safety</u>
a.	Increase	Increase
b.	Increase	Decrease
c.	Decrease	Decrease
d.	Decrease	Increase

39. When using a flexible budget, a decrease in production levels within a relevant range

- a. Decreases variable cost per unit.
- b. Decreases total costs.
- c. Increases total fixed costs.
- d. Increases variable cost per unit.

40. When production levels are expected to decline within a relevant range, and a flexible budget is used, what effect would be anticipated with respect to each of the following?

	<u>Variable costs per unit</u>	<u>Fixed costs per unit</u>
a.	No change	No change
b.	Increase	No change
c.	No change	Increase
d.	Increase	Increase

41. In an income statement prepared as an internal report, total fixed costs normally would be shown separately under

	<u>Absorption costing</u>	<u>Variable costing</u>
a.	No	No
b.	No	Yes
c.	Yes	Yes
d.	Yes	No

42. Based on potential sales of 500 units per year, a new product has estimated traceable costs of \$990,000. What is the target price to obtain a 15% profit margin on sales?

- a. \$2,329
- b. \$2,277
- c. \$1,980
- d. \$1,935

43. The following information pertains to Syl Co.:

Sales	\$800,000
Variable costs	160,000
Fixed costs	40,000

What is Syl's breakeven point in sales dollars?

- a. \$200,000
- b. \$160,000
- c. \$50,000
- d. \$40,000

Items 44 and 45 are based on the following information:

Gordon Company began its operations on January 1, 19X2, and produces a single product that sells for \$10 per unit. Gordon uses an actual (historical) cost system. In 19X2, 100,000 units were produced and 80,000 units were sold. There was no work-in-process inventory at December 31, 19X2. Manufacturing costs and selling and administrative expenses for 19X2 were as follows:

	<u>Fixed costs</u>	<u>Variable costs</u>
Raw materials	—	\$2.00 per unit produced
Direct labor	—	1.25 per unit produced
Factory overhead	\$120,000	.75 per unit produced
Selling and administrative	70,000	1.00 per unit sold

44. What would be Gordon's operating income for 19X2 under the variable (direct) costing method?
- \$114,000
 - \$210,000
 - \$234,000
 - \$330,000

45. What would be Gordon's finished goods inventory at December 31, 19X2, under the absorption costing method?
- \$ 80,000
 - \$104,000
 - \$110,000
 - \$124,000

46. Cook Co.'s total costs of operating five sales offices last year were \$500,000, of which \$70,000 represented fixed costs. Cook has determined that total costs are significantly influenced by the number of sales offices operated. Last year's costs and number of sales offices can be used as the bases for predicting annual costs. What would be the budgeted costs for the coming year if Cook were to operate seven sales offices?
- \$700,000
 - \$672,000
 - \$614,000
 - \$586,000

Items 47 and 48 are based on the following data:
The following information pertains to Rica Company:

Sales (50,000 units)	\$1,000,000
Direct materials and direct labor	300,000
Factory overhead:	
Variable	40,000
Fixed	70,000
Selling and general expenses:	
Variable	10,000
Fixed	60,000

47. How much was Rica's break-even point in number of units?
- 9,848
 - 10,000
 - 18,571
 - 26,000

48. What was Rica's contribution margin ratio?
- 66%
 - 65%
 - 59%
 - 35%

49. Break-even analysis assumes that over the relevant range
- Unit revenues are nonlinear.
 - Unit variable costs are unchanged.
 - Total costs are unchanged.
 - Total fixed costs are nonlinear.

50. At December 31, 1990, Zar Co. had a machine with an original cost of \$84,000, accumulated depreciation of \$60,000, and an estimated salvage value of zero. On December 31, 1990, Zar was considering the purchase of a new machine having a five-year life, costing \$120,000, and having an estimated salvage value of \$20,000 at the end of five years. In its decision concerning the possible purchase of the new machine, how much should Zar consider as sunk cost at December 31, 1990?
- \$120,000
 - \$100,000
 - \$24,000
 - \$4,000

Probability and Regression Analysis

Items 51 through 53 are based on the following information:

As the accounting consultant for Leslie Company you have compiled data on the day-to-day demand rate from Leslie's customers for Product A and the lead time to receive Product A from its supplier. The data are summarized in the following probability tables:

<u>Demand for Product A</u>	
<u>Unit Demand</u> <u>per Day</u>	<u>Probability of</u> <u>Occurrence</u>
0	.45
1	.15
2	.30
3	.10
	<u>1.00</u>

<u>Lead Time for Product A</u>	
<u>Lead Time</u> <u>in Days</u>	<u>Probability of</u> <u>Occurrence</u>
1	.40
2	.35
3	<u>.25</u>
	<u>1.00</u>

Leslie is able to deliver Product A to its customers the same day that Product A is received from its supplier. All units of Product A demanded but not available, due to a stock-out, are backordered and are filled immediately when a new shipment arrives.

51. The probability of the demand for Product A being nine units during a three-day lead time for delivery from the supplier is

- .00025.
- .10.
- .025.
- .25.

52. If Leslie reorders 10 units of Product A when its inventory level is 10 units, the number of days during a 360-day year that Leslie will experience a stock-out of Product A is

- 0.75 days.
- 36 days.
- 10 days.
- 0 days.

53. Leslie has developed an inventory model based on the probability tables and desires a solution for minimizing total annual inventory costs. Included in inventory costs are the costs of holding Product A, ordering and receiving Product A, and incurring stockouts of Product A. The solution would state:

- At what inventory level to reorder and how many units to reorder.
- Either at what inventory level to reorder or how many units to reorder.
- How many units to reorder but not at what inventory level to reorder.
- At what inventory level to reorder but not how many units to reorder.

54. A sales office of Helms, Inc., has developed the following probability distribution for daily sales of a perishable product.

<u>X (Units Sold)</u>	<u>P (Sales = X)</u>
100	.2
150	.5
200	.2
250	.1

The product is restocked at the start of each day. If the Company desires a 90% service level in satisfying sales demand, the initial stock balance for each day should be

- 250.
- 160.
- 200.
- 150.

55. Your client wants your advice on which of two alternatives he should choose. One alternative is to sell an investment now for \$10,000. Another alternative is to hold the investment three days after which he can sell it for a certain selling price based on the following probabilities:

<u>Selling Price</u>	<u>Probability</u>
\$5,000	.4
\$8,000	.2
\$12,000	.3
\$30,000	.1

Using probability theory, which of the following is the most reasonable statement?

- Hold the investment three days because the expected value of holding exceeds the current selling price.
- Hold the investment three days because of the chance of getting \$30,000 for it.
- Sell the investment now because the current selling price exceeds the expected value of holding.
- Sell the investment now because there is a 60% chance that the selling price will fall in three days.

56. To assist in an investment decision, Gift Co. selected the most likely sales volume from several possible outcomes. Which of the following attributes would that selected sales volume reflect?

- The mid-point of the range.
- The median.
- The greatest probability.
- The expected value.

57. Dough Distributors has decided to increase its daily muffin purchases by 100 boxes. A box of muffins costs \$2 and sells for \$3 through regular stores. Any boxes not sold through regular stores are sold through Dough's thrift store for \$1. Dough assigns the following probabilities to selling additional boxes:

<u>Additional sales</u>	<u>Probability</u>
60	.6
100	.4

What is the expected value of Dough's decision to buy 100 additional boxes of muffins?

- \$28
- \$40
- \$52
- \$68

58. Joe Neil, CPA, has among his clientele a charitable organization that has a legal permit to conduct games of chance for fund-raising purposes. Neil's client derives its profit from admission fees and the sale of refreshments, and therefore wants to "break even" on the games of chance. In one of these games, the player draws one card from a standard deck of 52 cards. A player drawing any one of four "queens" wins \$5, and a player drawing any one of 13 "hearts" wins \$2. Neil is asked to compute the price that should be charged per draw, so that the total amount paid out for winning draws can be expected to equal the total amount received from all draws. Which one of the following equations should Neil use to compute the price (P)?

- $5 - 2 = \frac{35}{52}P$
- $\frac{4}{52}(5) + \frac{13}{52}(2) = \frac{35}{52}P$
- $\frac{4}{52}(5 - P) + \frac{13}{52}(2 - P) = P$
- $\frac{4}{52}(5) + \frac{13}{52}(2) = P$

59. Duguid Company is considering a proposal to introduce a new product, XPL. An outside marketing consultant prepared the following payoff probability distribution describing the relative likelihood of monthly sales volume levels and related income (loss) for XPL:

<u>Monthly sales volume</u>	<u>Probability</u>	<u>Income (loss)</u>
3,000	0.10	\$(35,000)
6,000	0.20	5,000
9,000	0.40	30,000
12,000	0.20	50,000
15,000	0.10	70,000

If Duguid decides to market XPL, the expected value of the added monthly income will be

- \$24,000.
- \$26,500.
- \$30,000.
- \$120,000.

60. The following information pertains to three shipping terminals operated by Krag Co.:

<u>Terminal</u>	<u>Percentage of cargo handled</u>	<u>Percentage of error</u>
Land	50	2
Air	40	4
Sea	10	14

Krag's internal auditor randomly selects one set of shipping documents, ascertaining that the set selected contains an error. The probability that the error occurred in the Land Terminal is

- 2%
- 10%
- 25%
- 50%

61. If the coefficient of correlation between two variables is zero, how might a scatter diagram of these variables appear?

- Random points.
- A least squares line that slopes up to the right.
- A least squares line that slopes down to the right.
- Under this condition, a scatter diagram could not be plotted on a graph.

62. Which of the following may be used to estimate how inventory warehouse costs are affected by both the number of shipments and the weight of materials handled?

- Economic order quantity analysis.
- Probability analysis.
- Correlation analysis.
- Multiple regression analysis.

63. A quantitative technique used to make predictions or estimates of the value of a dependent variable from given values of an independent variable(s) is
- Linear programming.
 - Regression analysis.
 - Trend analysis.
 - Queuing theory.

64. Your client, a retail store, is interested in the relationship between sales (independent variable) and theft losses (dependent variable). Using the proper formula, you compute the coefficient of correlation at .95. What can you definitely conclude about these factors (sales and theft losses)?
- An increase in sales causes an increase in theft losses.
 - Movement of these factors is in opposite directions.
 - Movement of these factors is entirely unrelated.
 - Movement of these factors is in the same direction.

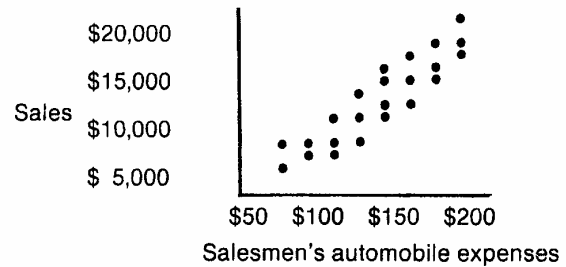
65. Multiple regression analysis involves the use of

	<u>Dependent variables</u>	<u>Independent variables</u>
a.	One	More than one
b.	More than one	More than one
c.	More than one	One
d.	One	One

66. Under frost-free conditions, Cal Cultivators expects its strawberry crop to have a \$60,000 market value. An unprotected crop subject to frost has an expected market value of \$40,000. If Cal protects the strawberries against frost, then the market value of the crop is still expected to be \$60,000 under frost-free conditions and \$90,000 if there is a frost. What must be the probability of a frost for Cal to be indifferent to spending \$10,000 for frost protection?
- .167
 - .200
 - .250
 - .333

67. What is the appropriate range for the coefficient of correlation (r)?
- $0 \leq r \leq 1$.
 - $-1 \leq r \leq 1$.
 - $-100 \leq r \leq 100$.
 - $-\infty \leq r \leq \infty$.

68. A scatter chart depicting the relationship between sales and salesmen's automobile expenses is set forth below:



What can we deduce from the chart about the relationship between sales and salesmen's automobile expenses?

- A high degree of linear correlation.
- A high degree of nonlinear correlation.
- No apparent correlation.
- Both sales and salesmen's automobile expenses are independent variables.

69. Day Mail Order Co. applied the high-low method of cost estimation to customer order data for the first 4 months of 1995. What is the estimated variable order filling cost component per order?

<u>Month</u>	<u>Orders</u>	<u>Cost</u>
January	1,200	\$ 3,120
February	1,300	3,185
March	1,800	4,320
April	<u>1,700</u>	<u>3,895</u>
	<u>6,000</u>	<u>\$14,520</u>

- \$2.00
 - \$2.42
 - \$2.48
 - \$2.50
70. Multiple regression analysis
- Establishes a cause and effect relationship.
 - Is **not** a sampling technique.
 - Involves the use of independent variables only.
 - Produces measures of probable error.
71. Multiple regression differs from simple regression in that it
- Provides an estimated constant term.
 - Has more dependent variables.
 - Allows the computation of the coefficient of determination.
 - Has more independent variables.

72. Waldo Company, which produces only one product, provides its most current month's data as follows:

Selling price per unit	\$80
------------------------	------

Variable costs per unit:

Direct materials	21
Direct labor	10
Variable manufacturing overhead	3
Variable selling and administrative	6

Fixed costs:

Manufacturing overhead	\$76,000
Selling and administrative	58,000

Units:

Beginning inventory	0
Month's production	5,000
Number sold	4,500
Ending inventory	500

Based upon the above information, what is the total contribution margin for the month under the variable costing approach?

- a. \$46,000
- b. \$180,000
- c. \$207,000
- d. \$226,000

Chapter Thirteen

Managerial Analysis and Control Problems

NUMBER 1

Management of Bicent Company uses the following unit costs for the one product it manufactures:

	<u>Projected Cost per Unit</u>
Direct material (all variable)	\$30.00
Direct labor (all variable)	19.00
Manufacturing overhead:	
Variable cost	6.00
Fixed cost (based on 10,000 units per month)	5.00
Selling, general and administrative:	
Variable cost	4.00
Fixed cost (based on 10,000 units per month)	2.80

The projected selling price is \$80 per unit. The fixed costs remain fixed within the relevant range of 4,000 to 16,000 units of production.

Management has also projected the following data for the month of June 19X1:

	<u>Units</u>
Beginning inventory	2,000
Production	<u>9,000</u>
Available	11,000
Sales	<u>7,500</u>
Ending inventory	<u>3,500</u>

Required:

Prepare projected income statements for June 19X1 for management purposes under **each** of the following product-costing methods:

1. Absorption costing with all variances charged to cost of goods sold each month.
2. Direct (variable) costing.

Supporting schedules calculating inventoriable production costs per unit should be presented in good form. **Ignore Income taxes.**

NUMBER 2

A company is presently using breakeven analysis. The president has requested an explanation of this analytical tool.

Required:

1. What is the breakeven point and how is it computed?
2. What are the major uses of breakeven analysis?

NUMBER 3

Grisp Company, a manufacturer with heavy investments in property, plant, and equipment, is presently using absorption costing for both its external and internal reporting. The management of Grisp Company is considering using the direct costing method for internal reporting only.

Required:

1. What would be the rationale for using the direct costing method for internal reporting?
2. Assuming that the quantity of ending inventory is higher than the quantity of beginning inventory, would operating income using direct costing be different from operating income using absorption costing? If so, specify if it would be higher or lower. Discuss the rationale for your answer.

NUMBER 4

Seco Corp., a wholesale supply company, engages independent sales agents to market the company's lines. These agents currently receive a commission of 20% of sales, but they are demanding an increase to 25% of sales made during the year ending December 31, 1989. Seco had already prepared its 1989 budget before learning of the agents' demand for an increase in commissions. The following pro forma income statement is based on this budget:

Seco Corp.
PRO FORMA INCOME STATEMENT
For the Year Ending December 31, 1989

Sales		\$10,000,000
Cost of sales		<u>6,000,000</u>
Gross margin		4,000,000
Selling and administrative costs		
Commissions	\$2,000,000	
All other costs (fixed)	<u>100,000</u>	<u>2,100,000</u>
Income before income tax		1,900,000
Income tax (30%)		<u>570,000</u>
Net income		<u>\$ 1,330,000</u>

Seco is considering the possibility of employing its own salespersons. Three individuals would be required, at an estimated annual salary of \$30,000 each, plus commissions of 5% of sales. In addition, a sales manager would be employed at a fixed annual salary of \$160,000. All other fixed costs, as well as the variable cost percentages, would remain the same as the estimates in the 1989 pro forma income statement.

Required:

- a. Compute Seco's estimated breakeven point in sales dollars for the year ending December 31, 1989, based on the pro forma income statement prepared by the company.
- b. Compute Seco's estimated breakeven point in sales dollars for the year ending December 31, 1989, if the company employs its own salespersons.
- c. Compute the estimated volume in sales dollars that would be required for the year ending December 31, 1989, to yield the same net income as projected in the pro forma income statement, if Seco continues to use the independent sales agents and agrees to their demand for a 25% sales commission.
- d. Compute the estimated volume in sales dollars that would generate an identical net income for the year ending December 31, 1989, regardless of whether Seco employs its own salespersons or continues to use the independent sales agents and pays them a 25% commission.

NUMBER 5

Daly Company has determined the number of units of Product Y that Daly would have to sell in order to break even. However, Daly would like to attain a 20 percent profit on sales of Product Y.

Required:

1. Explain how breakeven analysis can be used to determine the number of units of Product Y that Daly would have to sell to attain a 20 percent profit on sales.
2. If variable cost per unit increases as a percentage of the sales price, how would that affect the number of units of Product Y that Daly would have to sell in order to break even and why?
3. Identify the limitations of breakeven analysis in managerial decision making.

NUMBER 6

Leif Company is faced with the necessity of making the following financial management decision involving its Sigma Division:

Establishment of a selling price for a new product, called Kace, developed by Sigma. Kace's variable cost is \$3 per unit. The following probabilities of reaching annual sales levels for Kace have been estimated:

<u>Sales</u> <u>(in units)</u>	<u>If each unit is sold for</u>		
	<u>\$6</u>	<u>\$7</u>	<u>\$8</u>
70,000	10%	40%	70%
80,000	50%	30%	20%
90,000	40%	30%	10%

Required:

As a guide to Leif Company in determining a selling price for Kace, prepare a schedule of the expected annual contribution margin for each of the sales prices proposed for Kace.

NUMBER 7

Lond Co. produces joint products Jana and Reta, together with byproduct Bynd. Jana is sold at split-off, whereas Reta and Bynd undergo additional processing. Production data pertaining to these products for the year ended December 31, 1989, were as follows:

	<u>Jana</u>	<u>Reta</u>	<u>Bynd</u>	<u>Total</u>
Joint costs				
Variable				\$ 88,000
Fixed				148,000
Separable costs				
Variable		\$120,000	\$3,000	123,000
Fixed		90,000	2,000	92,000
Production in pounds	50,000	40,000	10,000	100,000
Sales price per pound	\$4.00	\$7.50	\$1.10	

There were no beginning or ending inventories. No materials are spoiled in production. Variable costs change in direct proportion to production volume. Bynd's net realizable value is deducted from joint costs. Joint costs are allocated to joint products to achieve the same gross margin percentage for each joint product.

Although 1989 performance could be repeated for 1990, Lond is considering possible operation of the plant at full capacity of 120,000 pounds. The relative proportions of each product's output with respect to cost behavior and production increases would be unchanged. Market surveys indicate that prices of Jana and Bynd would have to be reduced to \$3.40 and \$0.90, respectively. Reta's expected price decline cannot be determined.

Required:

- a. Compute Lond's breakeven point in pounds for the year ended December 31, 1989.
- b. Prepare the following schedules for Lond Co. for the year ending December 31, 1990:
 1. Projected production in pounds for each product at full capacity.
 2. Differential revenues (excluding Reta).
 3. Differential costs.
 4. Sales price required per pound of Reta in order for Lond to achieve the same gross margin as that for 1989.

NUMBER 8

The following information pertains to a product for a 10-week budget period:

Sales price	\$11 per unit
Materials	\$3 per unit
Manufacturing conversion costs	
Fixed	\$210,000
Variable	\$2 per unit
Selling and administrative costs	
Fixed	\$45,000
Variable	\$1 per unit
Beginning accounts payable for materials	\$40,000

Manufacturing and sales of 70,000 units are expected to occur evenly over the period.

Materials are paid for in the week following use.

There are no beginning inventories.

Required:

For **Items 1 through 5**, determine the correct amount using the above information. Any information contained in an item is unique to that item and is **not** to be incorporated in your calculations when answering other items.

1. What amount should be budgeted for cash payments to material suppliers during the period?
2. Using variable costing, what is the budgeted income for the period?
3. Using absorption costing, what is the budgeted income for the period?
4. Actual results are as budgeted, except that only 60,000 of the 70,000 units produced were sold. Using absorption costing, what is the difference between the reported income and the budgeted net income?
5. If a special order for 4,000 units would cause the loss of 1,000 regular sales, what minimum amount of revenue must be generated from the special order so that net income is not reduced? (All cost relationships are unchanged.)

Chapter Thirteen

Solutions to Managerial Analysis and Control Questions

1. (c)	Selling price per unit		\$5.00
	Less: Variable cost per unit		<u>3.00</u>
	Contribution margin		<u>\$2.00</u>
	Fixed Cost mfg. (.25 100,000 units)		\$25,000
	Fixed cost selling (.65 100,000 units)		<u>65,000</u>
	Total Fixed Costs		<u>\$90,000</u>
	B.E.P. =	$\frac{\text{Fixed Costs}}{\text{Contribution margin}}$	= $\frac{\$90,000}{\$2}$ = <u>45,000</u> units

2. (c)	Total Contribution Margin (\$2 110,000 units)	\$220,000
	Less: Total fixed costs	<u>90,000</u>
	Net Income	<u>\$130,000</u>

3. (d) If all variances are charged to cost of goods sold, the net income under absorption costing will differ from that under direct costing by the amount of fixed cost assigned to the increase or decrease in inventory. If inventory increases, fixed costs are transferred to the following period, thereby increasing net income under absorption costing. If inventory decreases, fixed costs from prior periods are expensed, thereby reducing net income.

Increase in inventory 10,000 units \$.25 fixed manufacturing costs per unit = \$2,500 fixed cost transferred to the next period. Therefore, net income under absorption costing is \$132,500—(\$130,000 + \$2,500).

4. (a) (Selling price – \$3 variable cost) 10,000 units = \$5,000 net income

$$\begin{aligned}
 10,000(X - 3) &= 5000 \\
 10,000X - 30,000 &= 5000 \\
 10,000X &= 35,000 \\
 X &= 35,000 / 10,000 = \underline{\$3.50} \text{ Selling Price}
 \end{aligned}$$

5. (b)	Selling price (\$5.00 1.20)	\$6.00
	Less: V.C. mfg. (\$1.00 1.10)	(1.10)
	V.C. selling	<u>(2.00)</u>
	Contribution Margin	\$2.90
	Less: Profit per unit (.1 \$2.90)	<u>.29</u>
	Adjusted C.M. per unit	<u>\$2.61</u>
	# units = \$104,400 / 2.61 = <u>40,000</u> units	

OR

$$\begin{aligned}
 \# \text{ units} &= \frac{\text{FC} + \text{Profit}}{\text{CM}} \\
 X &= \frac{\$104,400 + .29(X)}{2.90} \\
 2.90X &= \$104,400 + .29X \\
 2.90X - .29X &= \$104,400 \\
 2.61X &= \$104,400 \\
 X &= \$104,400 / 2.61 = \underline{40,000} \text{ units}
 \end{aligned}$$

6. (b) $BEP = \text{Fixed Costs} \% \text{ Contribution Margin} \%$

Fixed Cost:

Cost of goods sold (10% \$2,000,000 sales)	\$200,000
Other expenses (15% \$2,000,000 sales)	<u>300,000</u>
Total fixed costs	\$500,000

Contribution margin %

Selling price	100%
Less: Variable cost %	
Cost of goods sold	50%
Other expenses	<u>20%</u>
Contribution margin %	<u>30%</u>

$$BEP = FC \quad CM \% = \$500,000 \quad 30\% = \underline{\underline{\$1,666,667}}$$

7. (d) As both products can utilize full capacity, the greatest profit will result from the greatest contribution margin (selling price - variable costs) for capacity. Fixed costs are irrelevant as they are not effected by the decision.

$$\begin{aligned} 8. (b) \quad \text{BEP in dollar sales} &= \text{Fixed costs} \quad \text{contribution margin \%} \\ &= \$20,000 \quad 80\%* \\ &= \underline{\underline{\$25,000}} \end{aligned}$$

$$\begin{aligned} * \text{Contribution margin \%} &= 1 - [\text{variable cost} \quad \text{sales}] \\ &= 1 - [\$80,000 \quad \$400,000] \\ &= 1 - .20 \\ &= 80\% \end{aligned}$$

9. (b) Under the direct or variable costing method, variable costs are deducted from revenue to determine contribution margin, and *all* fixed costs (manufacturing, selling, general and administrative) are then deducted to obtain net income or income from operations.

The contribution margin is calculated in two steps:

1. Revenue less variable cost of goods sold = Contribution margin: manufacturing
2. Contribution margin: manufacturing less other variable costs (S, G & A) = Contribution margin: final

10. (b) \$20,000.

Increase in inventory	1000 units
Fixed manufacturing costs per unit	<u>\$20</u>
Fixed manufacturing costs included in ending inventory	<u><u>\$20,000</u></u>

If inventory increases (production exceeds sales), absorption costing results in greater net income than direct (variable) costing, due to the fixed manufacturing costs included in inventory.

11. (a) Generally when you plot activity on a graph, your vertical axis (Y) is your cost, while your horizontal axis (X) is your activity. Since there is a fixed rental cost, this would be plotted by a straight horizontal line originating part way up on the Y axis at the zero level of activity (X), thus indicating I or II as possible answers. The variable portion of the rent is based upon sales, which is added to the straight fixed line at increasingly smaller increments as sales (plotted on the X axis) are increased. Therefore, A or line I is your answer. Answer (b) is incorrect because it shows larger increments being added to the fixed costs.

12. (a) If inventory decreases (production is less than units sold) absorption costing results in less net income than direct (variable) costing due to the fixed manufacturing costs included in the beginning inventory under absorption costing.

13. (d) Breakeven (cost-volume-profit) analysis assumes sales revenue per unit and variable cost per unit are constant within the relevant range. Therefore, variable cost as a percentage of sales revenue would be **the same** at all levels of activity within the relevant range.

Breakeven (CVP) analysis assumes that total fixed costs remain constant within the relevant range. Therefore, fixed costs as a percentage of sales revenue would be **greater** at lower levels of activity (a) than at higher levels of activity (b).

For explanation of chart, refer to text page 13-5.

14. (c) Breakeven point represents your fixed costs divided by your contribution margin. Mathematically, by decreasing your numerator (fixed costs) or increasing your denominator (contribution margin), your breakeven point must decrease.

15. (b) The original cost and carrying value (cost less accumulated depreciation) of an old asset is a "sunk cost" for replacement decisions as the replacement would not affect these amounts. A sunk cost is a cost which has been incurred and will not be changed by any future decisions. It is, therefore, irrelevant to a decision and excluded in its analysis.

The disposal value (fair market value) of the *new* asset (or the *old* asset) is a cash flow that will only result if the replacement is made and the old asset is disposed of. Because it is dependent upon the replacement decision it is relevant to the decision.

16. (a) Remachine and \$5,000.

	<u>Alternatives</u>	
	<u>Remachine</u>	<u>Scrap</u>
Proceeds	\$9,000	\$1,000
Additional Cost	<u>5,000</u>	<u>—0—</u>
Net proceeds	\$4,000	\$1,000

The inventory carrying value of \$20,000 is not relevant to the decision since under either alternative the \$20,000 is a cost (sunk cost).

17. (b) Fixed costs = \$200,000

Contribution margin—Tetra = \$1

Contribution margin—Min = \$2

For every unit of Min sold, two units of Tetra are sold. Therefore, the combined contribution margin for each unit of Min sold would be: (1 unit \$2) + (2 units \$1) = \$4.

$$\begin{aligned} \text{Breakeven} &= \frac{\text{Fixed costs}}{\text{Contribution margin}} \\ &= \frac{\$200,000}{\$4} \\ &= 50,000 \text{ units (Min)} \end{aligned}$$

Proof: (50,000 Min \$2) + (100,000 Tetra \$1) = \$200,000 (Fixed costs)

18. (d) \$500,000.

Weighted average of variable costs to sales:

	<u>Percent of Sales</u>	<u>Percent of VC</u>	<u>Value</u>
A	60	60	36%
B	40	85	<u>34%</u>
			70%
Sales	1.00	(100%)	
Variable cost	<u>.70</u>	(70%)	
Contribution	.30	(30%)	
Breakeven =	<u>FC \$150,000</u>		
	Contribution .30	= \$500,000	

19. (d) \$680,000.

Fixed cost = \$150,000 + 30%	150,000 =	\$195,000
Add: Net Income generated		<u>9,000</u>
		\$204,000

$$\text{Breakeven} = \frac{\$204,000}{.30^1} = \$680,000$$

¹Computed in previous problem

Alternatively, the .30 composite contribution rate could be computed by subtracting the percent of variable cost from 100% and multiplying percent of sales by the result, e.g.:

$$\begin{aligned} \text{A } 60\% & (100\% - 60\%) = 24\% \\ \text{B } 40\% & (100\% - 85\%) = \underline{6\%} \\ & \qquad \qquad \qquad 30\% \end{aligned}$$

20. (b)	<u>Ratio</u>	<u>CM</u>	<u>Total CM</u>
X	3	\$1.00	\$ 3.00
Y	6	1.50	9.00
Z	1	3.00	<u>3.00</u>
			<u>\$15.00</u>

$$\text{BEP} = \frac{\text{FC}}{\text{CM}} = \frac{600,000}{15} = 40,000 \text{ (of 3x, 6y, 1z)}$$

of X at BEP = 40,000 \times 3 = **120,000**.

21. (c) Under the direct or variable costing method, variable costs are deducted from sales revenue to determine contribution margin and **all** fixed costs (overhead, selling, general and administrative) are then deducted to obtain net income or income from operations. The contribution margin is calculated in two steps:

1. Sales revenue less (variable) cost of goods sold = Contribution margin: manufacturing
2. Contribution margin: manufacturing less other variable costs (S, G & A) = Contribution margin: final

22. (c) \$49.22

\$60	=	Food Cost	+	Service charge	+	Sales Tax
	=	FC	+	15% FC	+	.06 (FC + 15%FC)
	=	FC	+	.15FC	+	.06 (1.15 FC)
	=			1.15 FC	+	.069 FC
	=			1.219 FC		
	=			<u>60</u>	=	FC
				1.219		
				<u>\$49.22</u>	=	Food Cost

23. (b) \$640,000.

Relevant costs per unit:

DM	\$ 4	
DL	16	
VOH	8	
FOH @ 40%	<u>4</u>	
	\$32	20,000 = \$640,000

The fixed overhead of \$6 per unit will continue regardless; therefore, only the cost that will not be incurred if part is bought outside is considered.

24. (b) \$24,000 B.E.P.

Sales	200,000
Less: margin of safety	<u>(80,000)</u>
Sales at Break-even point	120,000
Contribution margin	<u>x .20</u>
Fixed Cost	<u>24,000</u>

BEP in \$ Sales = Fixed Costs / Contribution Margin %

Therefore, Fixed Cost = BEP \$ Sales x Contribution Margin %

25. (d) Gross profit (margin) is a term associated with absorption costing; however, it is not applicable to variable (or direct) costing. Under variable (direct) costing, the cost of goods sold includes only the variable costs associated with the inventory sold and sales less (variable) cost of goods sold is referred to as contribution margin—manufacturing. Operating income applies to both variable and absorption costing.

26. (b)

	<u>Total</u>	<u>Per unit</u> <u>(25,000 units)</u>
Sales	\$500,000	\$20.00
Less: Variable costs:		
Direct materials and labor	(150,000)	(6.00)
Overhead	(20,000)	(.80)
Selling and general	<u>(5,000)</u>	<u>(.20)</u>
Contribution margin	\$325,000	\$13.00

$$\begin{aligned} \text{Breakeven point in units} &= \text{Fixed costs} / \text{contribution margin per unit} \\ &= (\$35,000 + \$30,000) / \$13 \\ &= \underline{5,000} \end{aligned}$$

27. (a) 1990 total fixed costs—decreased; 1990 unit variable costs—increased.

Decrease in fixed costs: At zero volume, the lines 0G (zero G) and 0E (zero E) represent the fixed costs (loss at zero volume) for 1990 and 1989, respectively. The fixed costs for 1990 (line 0G), are less than the fixed costs for 1989 (line 0E). Therefore, fixed costs decreased from 1989 to 1990.

Increase in variable costs: The slope of the profit-volume line for 1990, line GH, is less than the slope of the 1989 profit-volume line EF; therefore, the contribution margin for 1990 is less than 1989. If selling price is unchanged, the decrease in contribution margin must be due to an increase in variable costs for 1990.

Alternative: The breakeven point is the point where the profit line intersects the zero dollar line. Despite the decrease in fixed costs for 1990, the breakeven point for 1990 is greater than for 1989; therefore, the contribution margin for 1990 must be less than 1989. If selling price is unchanged, the decrease in contribution margin is due to an increase in variable costs.

28. (d) Under direct or variable costing, product costs or inventoriable costs include only variable manufacturing costs (direct material, direct labor and variable overhead). Variable selling costs are used in the calculation of contribution margin; however, they are not a product cost (inventoriable).

29. (a) Direct materials	\$ 20,000
Direct labor	55,000
Variable overhead	45,000
Avoidable fixed overhead (\$4 10,000)	40,000
Foregone rent	<u>15,000</u>
Cost to make	\$175,000
Cost to buy (\$18 10,000)	<u>180,000</u>
Additional cost of buying	<u>\$ 5,000</u>

30. (a) Contribution margin is a term associated with variable (direct) costing; however, it is not applicable to absorption costing. Contribution margin is sales less all variable costs and it is from this amount that all fixed costs (manufacturing, selling and administrative) are deducted to determine operating income.

Under absorption costing, cost of goods sold includes both variable and fixed manufacturing costs and sales less cost of goods sold is referred to as gross profit or gross margin.

31. (a) \$300,000 margin of safety.

Margin of safety is the excess of actual or budgeted sales (\$1,000,000) over sales at the breakeven point (\$700,000). It is the amount by which sales could decrease before a loss occurs.

32. (a)	Direct material (\$40,000 / 10,000)	\$4.00
	Direct labor (\$20,000 / 10,000)	2.00
	Variable overhead (\$12,000 / 10,000)	<u>1.20</u>
	Per unit cost	\$7.20
	Ending inventory units	<u>1,000</u>
		<u>\$7,200</u>

33. (a)	Fixed cost per unit (\$25,000 / 10,000 units)	\$ 2.50
	Increase in inventory units	<u>1,000</u>
	Fixed costs assigned to inventory	<u>\$2,500</u>

34. (b)	Selling price	\$23
	Variable manufacturing cost	(16)
	Incremental cost (overtime premium)	<u>(3)</u>
	Contribution margin per unit	\$ 4
	Units	<u>40,000</u>
	Total contribution from special order	<u>\$160,000</u>

35. (a) \$50,000.

$$\begin{aligned} \text{BEP } \$ \text{ Sales} &= \text{FC/CM\%} \\ \$800,000 &= \$100,000/\text{CM\%} \\ 1/8 &= \text{CM\%} \end{aligned}$$

Sales	\$1,200,000
- Sales @ BEP	<u>800,000</u>
Sales over BEP	\$ 400,000
CM%	<u>x 1/8</u>
Profit @ \$1,200,000 Sales	\$ <u>50,000</u>

36. (b)	Allocated overhead	\$48,000
	Less: Non avoidable overhead	<u>(21,000)</u>
	Decrease in overhead cost	27,000
	Less decrease in contribution margin	<u>(24,000)</u>
	Increase in income	<u>\$ 3,000</u>

37. (d) Sunk costs are costs that will not change or be affected by the selection of available alternatives. In this situation, the prior manufacturing costs of \$50,000 will be unaffected by subsequent processing or sale.

38. (b) Increase budgeted breakeven; Decrease margin of safety.

An increase in direct labor costs (a variable cost) would decrease the contribution margin (selling price – variable costs) and result in an increase in the breakeven point (FC/CM).

Margin of safety is the excess of actual or budgeted sales over sales at the breakeven point. It is the amount by which sales could decrease before a loss occurs. An increase in the breakeven point, resulting from an increase in direct labor costs, would cause a decrease in margin of safety.

39. (b) Within the relevant range, **total** fixed costs do not change and variable cost per unit does not change (total variable costs change proportionately with activity). Therefore, a decrease in the production level (within the relevant range) would result in an increase in fixed costs per unit as the total fixed costs are allocated to fewer units and a decrease in total variable costs as they change proportionally with activity or production.

40. (c) Within the relevant range, variable costs per unit do not change and *total* fixed costs do not change. Therefore, a decline in the production level (within the relevant range) would result in no change in variable costs per unit while fixed costs per unit would increase.

41. (b) Under the direct or variable costing method, variable costs are deducted from sales revenue to determine contribution margin and **all** fixed costs (overhead, selling, general and administrative) are then deducted to obtain net income or income from operations. The contribution margin is calculated in two steps:

1. Sales revenue less (variable) cost of goods sold = Contribution margin: manufacturing
2. Contribution margin: manufacturing less other variable costs (S, G & A) = Contribution margin: final

Under the absorption costing method, each cost classification (cost of goods sold, selling, general and administrative, etc.) includes both its fixed cost and variable cost components.

42. (a) \$2,329 Target price

Sales revenue	=	Cost of goods / cost percentage
	=	\$990,000 / .85
	=	\$1,164,706
Target price	=	Sales revenue / # units
	=	\$1,164,706 / 500
	=	<u>\$2,329</u>

Cost percentage: If profit margin on sales is 15%, then the cost of goods sold percentage is 85% (100% - 15%).

43. (c) The breakeven point in sales dollars represents your fixed costs divided by your contribution margin percentage. Fixed costs are given, but the contribution margin must be determined.

Sales	\$800,000	100%
Variable costs	<u>160,000</u>	<u>20%</u>
Contribution margin	<u>\$640,000</u>	<u>80%</u>
Fixed costs	\$ 40,000	
Divided by contribution margin	<u>80%</u>	
Breakeven sales	<u>\$ 50,000</u>	

44. (b)

Selling price	\$ 10
less: Variable costs	<u>5</u>
Contribution margin	5
# Units sold	<u>80,000</u>
Total contribution	400,000
less: Fixed costs	<u>\$190,000</u>
Net Income	<u>\$210,000</u>

45. (b) Absorption Cost Per Unit:

Raw materials	2.00
Direct labor	1.25
Overhead	.75
Variable	
Fixed (\$120,000 / 100,000 units)	<u>1.20</u>
	5.20
Ending Inventory (100,000 – 80,000)	<u>20,000</u>
	<u>\$104,000</u>

Note: Selling and administrative costs are not part of the product costs.

46. (b) This is a problem in the analysis of variable and fixed costs. Since costs are either variable or fixed, then of the \$500,000 in total costs, \$430,000 must be variable (\$500,000 less \$70,000 in fixed). It takes \$430,000 in variable costs to run five sales offices, or \$86,000 per office. If seven offices are being run, then:

7 offices @ \$86,000 =	\$602,000
Fixed costs	<u>70,000</u>
Total costs	<u>\$672,000</u>

47. (b)

	<u>Total</u>	<u>Per unit</u> <u>(50,000 units)</u>
Sales	\$1,000,000	\$20.00
Less variable costs		
Direct materials & labor	(300,000)	(6.00)
Overhead	(40,000)	(.80)
Selling, general admin.	<u>(10,000)</u>	<u>(.20)</u>
Contribution margin	\$ 650,000	<u>\$13.00</u>

$$\begin{aligned} \text{Breakeven point in units} &= \frac{\text{Fixed cost}}{\text{Contribution margin per unit}} \\ &= \frac{\$70,000 + \$60,000}{\$13} \\ &= \underline{\underline{\$10,000}} \end{aligned}$$

$$48. (b) \text{ Contribution margin Ratio} = \frac{\text{Contribution margin}}{\text{Selling price}} = \frac{\$13}{\$20} = \underline{\underline{.65}}$$

Note: Can also be calculated based on total contribution margin and sales (\$650,000 / \$1,000,000 = .65).

49. (b) Within the relevant range, variable costs per unit do not change.

A basic assumption of break-even / C.V.P. analysis is linearity; therefore, answers (a) and (d) are incorrect. As variable cost per unit are unchanged, total variable cost changes proportionately with activity. Therefore, total cost change and answer (c) is incorrect.

50. (c) A "sunk cost" is a cost which has been incurred and will not be changed by any future decision; it is therefore irrelevant to a decision and excluded in its analysis. The original cost of an asset less its accumulated depreciation (book value) is a sunk cost for replacement decisions as the replacement would not affect these amounts.

51. (a) The probability of the lead time being 3 days is 25%, and the probability of demand being 3 units in a day is 10%. The probability of 3 days of demand being 3 units (3 – 3 = 9) coupled with a 3-day lead time is as follows:

$$.25 \cdot .1 \cdot .1 \cdot .1 = .00025$$

52. (d) Maximum possible lead time is 3 days, and the maximum possible demand on any day is 3 units. Therefore, the maximum possible demand during lead time is 9 units (3 days \times 3 units per day). If 10 units are ordered when inventory is 10 units, there will be at least one unit in inventory when the shipment arrives.

53. (a) In order to control the cost of stock-outs as well as ordering and carrying costs, the model would have to state when to order (reorder point) as well as how many units to order (EOQ).

54. (c) The probability of demand being greater than 200 units is 10%; therefore, the probability that sales will be 200 units or less is 90% (100% – 10%). The 90% probability for sales of 200 or less units could also be determined by adding the individual probabilities for sale of 200 units or less (.2 + .5 + .2).

55. (a) Computation of expected selling price

<u>Selling Price</u>	<u>Probability of Selling Price</u>	=	<u>Expected Value</u>
\$ 5,000	.4		\$ 2,000
8,000	.2		1,600
12,000	.3		3,600
30,000	.1		<u>3,000</u>
Expected Selling Price			<u>\$10,200</u>

This solution does not provide for an analysis or evaluation of the individual's aversion to risk.

56. (c) Most probability problems have you compute the expected value from a series of possible outcomes, each weighted with its own likelihood of occurrence. However, in this problem, the company only wants to select the *most likely* sales volume figure. That would be the one with the greatest probability of occurrence.

57. (c) \$52.

Additional sales 60 boxes			
#60 boxes x (\$3 selling price - \$2 cost)		\$60	
#40 boxes x (\$1 selling price - \$2 cost)		<u>(40)</u>	
Profit		\$20	
Probability		<u>x .6</u>	
Expected value			\$12
Additional sales 100 boxes			
#100 boxes x (\$3 selling price - \$2 cost)		\$100	
-0- boxes x (\$1 selling price)		<u>-0-</u>	
Profit		\$100	
Probability		<u>x .4</u>	
Expected Profit			<u>40</u>
Expected profit (value) of decision			<u>\$52</u>

58. (d) Because the games of chance are to break even, the price charged (P) is to equal the expected payoff of the games.

The expected value of the payoffs are as follows:

Queens $\frac{4}{52}$ (\$5) The probability of drawing a queen from the deck of cards is 4/52.

Hearts $\frac{13}{52}$ (\$2) The probability of drawing a heart from the deck of cards is 13/52.

Therefore, $P = \frac{4}{52} (\$5) + \frac{13}{52} (\$2)$

59. (b)	<u>Monthly Sales</u>	<u>Probability</u>	<u>Income (Loss)</u>	<u>Expected Profit</u>
	3,000	.10	(35,000)	\$(3,500)
	6,000	.20	5,000	1,000
	9,000	.40	30,000	12,000
	12,000	.20	50,000	10,000
	15,000	.10	70,000	<u>7,000</u>
	Total expected profit			<u>\$26,500</u>

60. (c)	<u>Terminal</u>	<u>% of Cargo</u>	<u>% of Error</u>	<u>Expected Error Occurrence Rate</u>	<u>Probability Error is from Terminal</u>
	Land	50%	2%	1.0%	1.0 4.0 = 25%
	Air	40%	4%	1.6%	1.6 4.0 = 40%
	Sea	10%	14%	<u>1.4%</u>	1.4 4.0 = <u>35%</u>
				4.0%	100%

61. (a) When a correlation analysis produces a coefficient of zero, the implication is that there is absolutely no causal connection between the two variables. Plotting the points would show them as random points forming no pattern or cluster whatever.

62. (d) Multiple regression analysis.

Regression analysis is a mathematical technique used to predict the value of one variable and its changes (the dependent variable) based upon the value of some other variable (the independent variable). Simple regression analysis involves the use of only one independent (explanatory) variable, while multiple regression analysis allows for more than one independent variable.

63. (b) Regression analysis develops a mathematical function or formula. A function yields dependent variable values from independent variable values.

64. (d) .95 as a coefficient of correlation is very high (the maximum is at 1.0), thus showing a definite cause-effect relationship. (b) and (c) are obviously incorrect. (a) is incorrect because it does not provide for the fact that a decrease in sales would be associated with a decrease in theft. (d) is correct because it covers both possibilities, or, in other words, it is more correct than (a).

65. (a) Regression analysis (simple or multiple) is a sampling technique which measures the relationship (does not establish) of a dependent variable to one or more independent variables. If one independent variable is used the method is referred to as simple regression. If more than one independent variable is used the method is referred to as multiple regression.

66. (b) 20% probability of frost.

Cost of Protection	=	Benefit of Protection
Cost of Protection	=	Prob (Protected benefit - Unprotected benefit)
\$10,000	=	Prob (\$90,000 - \$40,000)
\$10,000	=	Prob (\$50,000)
<u>20%</u>	=	Probability

67. (b) Maximum correlation exists between +1 and -1.

68. (a) The grouping of plotted dots clearly shows a thrust from lower left to upper right. Such a pattern clearly invites the reader to read the dots as a broad line thereby implying the linear correlation. The regularity and density of the dots implies a high degree of such correlation.

69. (a) \$2.00.

	<u>Orders</u>	<u>Cost</u>		
High	1,800	\$4,320		
Low	<u>1,200</u>	<u>3,120</u>		
Change	600	\$1,200		
<u>Change in Cost</u>	<u>\$1,200</u>	=		\$2 per order
Change in Order	600			

70. (d) The coefficient of correlation and coefficient of determination are measures of probable error. Answers (a), (b) and (c) are incorrect as regression analysis (simple or multiple) is a sampling technique which measures the relationship (does not establish) of a dependent variable to one or more independent variables.

71. (d) Regression analysis is a sampling technique which measures the relationship of a dependent variable to one or more independent variables. If one independent variable is used, the method is referred to as simple regression. If more than one independent variable is used, the method is referred to as multiple regression.

72. (b) Contribution margin is sales – all variable cost. Therefore, sales minus direct materials, direct labor, variable manufacturing overhead and variable selling and administrative = contribution margin: $\$80 - (21 + 10 + 3 + 6) = \40 per unit x 4,500 units sold = \$180,000 total contribution margin.

Chapter Thirteen

Solutions to Managerial Analysis and Control Problems

NUMBER 1

1.

<i>Bicent Company</i>		
PROJECTED INCOME STATEMENT		
<i>For the Month of June 19X1 (Absorption Costing)</i>		
Sales (7,500 units × \$80)		\$600,000
Beginning inventory (2,000 units × \$60) (<i>Schedule 1</i>)	\$120,000	
Production (9,000 units × \$60)	<u>540,000</u>	
Available	660,000	
Ending inventory (3,500 units × \$60)	<u>210,000</u>	
Cost of goods sold before adjustment	450,000	
Adjustment for volume variance (production projected as 10,000 units as "normal"; 1,000 units underapplied × \$5 fixed manufacturing overhead)	<u>5,000</u>	
		<u>455,000</u>
Gross margin		145,000
Variable selling, general, and administrative (7,500 units × \$4)	30,000	
Fixed selling, general, and administrative (10,000 units × \$2.80)	<u>28,000</u>	<u>58,000</u>
Projected income		<u>\$ 87,000</u>

2.

<i>Bicent Company</i>		
PROJECTED INCOME STATEMENT		
<i>For the Month of June 19X1 (Direct Costing)</i>		
Sales (7,500 units × \$80)		\$600,000
Beginning inventory (2,000 units × \$55) (<i>Schedule 2</i>)	\$110,000	
Production (9,000 units × \$55)	<u>495,000</u>	
Available	605,000	
Ending Inventory (3,500 units × \$55)	<u>192,500</u>	
Variable cost of goods sold	412,500	
Variable selling, general, and administrative (7,500 units × \$4)	<u>30,000</u>	
Total variable costs		<u>442,500</u>
Contribution margin		157,500
Fixed manufacturing overhead (10,000 units × \$5)	50,000	
Fixed selling, general, and administrative (10,000 units × \$2.80)	<u>28,000</u>	
Total fixed costs		<u>78,000</u>
Projected income		<u>\$ 79,500</u>

Note (Not Required): The difference in the two projected income figures (\$87,000 – \$79,500) equals \$7,500. This is accounted for as the increase in inventory (3,500 – 2,000) times the fixed manufacturing overhead application rate (1,500 units × \$5). The \$7,500 of fixed manufacturing overhead is included in ending inventory under absorption costing, but it is expensed under direct (variable) costing.

Schedule 1

Schedule of Inventoriable Production Costs Per Unit
(Absorption Costing)

Direct material	\$30
Direct labor	19
Manufacturing overhead (variable)	6
Manufacturing overhead (fixed)	<u>5</u>
Total unit cost	<u>\$60</u>

Schedule 2

Schedule of Inventoriable Production Costs Per Unit
(Direct Costing)

Direct material	\$30
Direct labor	19
Manufacturing overhead (variable)	<u>6</u>
Total unit cost	<u>\$55</u>

NUMBER 2

1. The breakeven point is that level of activity (sales) at which neither profit nor loss results. The factors used in determining the breakeven point are sales price, variable cost, and fixed cost.
The breakeven point in units is computed by dividing the total fixed cost by the unit contribution margin (sales price less variable cost). The breakeven point in dollars is computed by dividing the total fixed cost by the contribution margin ratio (sales price divided into contribution margin).
2. The major uses of breakeven analysis are these:
 - It assists management in achieving profit objectives by enabling management to analyze fixed versus variable cost characteristics and production volumes.
 - It assists management in formulating pricing and product mix decisions.

NUMBER 3

1. The direct costing method is useful for internal reporting because it focuses attention on the fixed-variable cost relationship and the contribution margin concept. It facilitates managerial decision-making, product pricing, and cost control. It allows certain calculations to be readily made, such as breakeven points and contribution margins. The focus on the contribution margin (sales revenues less variable costs) enables management to emphasize profitability in making short-run business decisions. Fixed costs are not easily controllable in the short run and hence may not be particularly relevant for short-run business decisions.
2. Assuming that the quantity of ending inventory is higher than the quantity of beginning inventory, operating income using direct costing would be lower than operating income using absorption costing. Direct costing excludes fixed manufacturing overhead from inventories as it considers such costs to be period costs, which are expensed immediately; whereas, absorption costing includes fixed manufacturing overhead in inventories as it considers such costs to be product costs, which are expensed when the goods are sold. When the quantity of inventory increases during a period, direct costing produces a lower dollar increase in inventory than absorption costing. As a result, operating income would be lower.

NUMBER 4

Seco Corp.
Year Ending December 31, 1989

a.

Estimated Breakeven Point Based on Pro Forma Income Statement

Sales		\$10,000,000
Variable costs		
Cost of sales	\$6,000,000	
Commissions	<u>2,000,000</u>	<u>8,000,000</u>
Contribution margin		<u>\$ 2,000,000</u>
Contribution margin ratio (\$2,000,000 ÷ \$10,000,000)		<u>20%</u>
Fixed costs		\$ 100,000
Contribution margin ratio		<u>÷ .20</u>
Estimated breakeven point		<u>\$ 500,000</u>

b.

Estimated Breakeven Point With Company Employing Its Own Salespersons

Variable cost ratios		
Cost of sales		60%
Commissions		<u>5%</u>
Total		<u>65%</u>
Contribution margin ratio (100% – 65%)		<u>35%</u>
Fixed costs		
Sales manager		\$ 160,000
3 salespersons @ \$30,000 each		90,000
Administrative		<u>100,000</u>
Total		<u>\$ 350,000</u>
Fixed costs		\$ 350,000
Contribution margin ratio		<u>÷ 35%</u>
Estimated breakeven point		<u>\$1,000,000</u>

c.

Estimated Sales Volume Yielding Net Income Projected in Pro Forma Income Statement With Independent Sales Agents Receiving 25% Commission

Target income before income tax		\$ 1,900,000
Fixed costs		<u>100,000</u>
Total		<u>\$ 2,000,000</u>
Variable cost ratios		
Cost of sales		60%
Commissions		<u>25%</u>
Total		<u>85%</u>
Contribution margin ratio (100% – 85%)		<u>15%</u>
Target income + fixed costs		\$ 2,000,000
Contribution margin ratio		<u>÷ .15</u>
Estimated sales volume		<u>\$13,333,333</u>

d.

**Estimated Sales Volume Yielding An Identical Net Income
Regardless of Whether the Company Employs its Own Salespersons
or
Continues With Independent Sales Agents and Pays Them 25% Commission**

Total costs with agents receiving 25% commission = Total costs with company's own sales force

X = sales volume

$$\begin{aligned} \frac{\$ 8,500,000}{\$10,000,000} X + \$100,000 &= \frac{\$ 6,500,000}{\$10,000,000} X + \$350,000 \\ .85X + \$100,000 &= .65X + \$350,000 \\ .20X &= \$250,000 \\ X &= \underline{\underline{\$1,250,000}} \end{aligned}$$

NUMBER 5

1. Daly would determine the number of units of Product Y that it would have to sell to attain a 20 percent profit on sales by dividing total fixed costs plus desired profit (20 percent of the sales price per unit multiplied by the units to attain a 20 percent profit) by unit contribution margin (sales price per unit less variable cost per unit).
2. If variable cost per unit increases as a percentage of the sales price, Daly would have to sell more units of Product Y to break even. Because the unit contribution margin (sales price per unit less variable cost per unit) would be lower, Daly would have to sell more units to cover the fixed costs.
3. The limitations of breakeven analysis in managerial decision-making are as follows:
 - The breakeven chart is fundamentally a static analysis, and, in most cases, changes can only be shown by drawing a new chart or series of charts.
 - The amount of fixed and variable cost, as well as the slope of the sales line, is meaningful in a defined range of activity and must be redefined for activity outside the relevant range.
 - It is difficult to determine the fixed and variable components of cost.
 - It is assumed that product mix will be unchanged.
 - It is assumed that product technology will be unchanged.
 - It is assumed that labor productivity will be unchanged.
 - It is assumed that selling prices and other market conditions will be unchanged.

NUMBER 6

*Leif Company
Sigma Division*

**SCHEDULE OF EXPECTED ANNUAL CONTRIBUTION MARGIN
FOR KACE AT VARIOUS SALES PRICES**

<i>Sales price</i>	<i>Expected sales level (units)</i>	<i>Expected total sales</i>	<i>Expected variable costs at \$3</i>	<i>Expected contribution margin</i>
\$6	83,000 [1]	\$498,000	\$249,000	\$249,000
7	79,000 [2]	553,000	237,000	316,000
8	74,000 [3]	592,000	222,000	370,000

[1] 70,000 × 10% = 7,000
80,000 × 50% = 40,000
90,000 × 40% = 36,000
83,000

[2] 70,000 × 40% = 28,000
80,000 × 30% = 24,000
90,000 × 30% = 27,000
79,000

[3] 70,000 × 70% = 49,000
80,000 × 20% = 16,000
90,000 × 10% = 9,000
74,000

NUMBER 7

a.

Lond Co.
**COMPUTATION OF BREAKEVEN POINT
IN POUNDS**
For the Year Ended December 31, 1989

Sales			
Jana	\$200,000		
Reta	300,000		
Bynd	<u>11,000</u>	\$511,000	
Variable costs			
Joint	\$ 88,000		
Reta	120,000		
Bynd	<u>3,000</u>	<u>211,000</u>	
Contribution margin			<u>\$300,000</u>
Contribution margin per pound	$\frac{\$300,000}{100,000}$	=	<u>\$3.00</u>
Fixed costs			
Joint	\$148,000		
Reta	90,000		
Bynd	<u>2,000</u>		
Total fixed costs	<u>\$240,000</u>		
Breakeven point in pounds	$\frac{\$240,000}{\$3}$	=	<u>80,000</u>

b. 1.

Lond Co.
**PROJECTED PRODUCTION IN POUNDS
AT FULL CAPACITY**
For the Year Ending December 31, 1990

	<i>Jana</i>	<i>Reta</i>	<i>Bynd</i>	<i>Total</i>
Pounds of production for the year ended December 31, 1989	50,000	40,000	10,000	100,000
Projected increases				
Jana .5 × 20,000	10,000			
Reta .4 × 20,000		8,000		
Bynd .1 × 20,000			2,000	
Total increase	<u> </u>	<u> </u>	<u> </u>	<u>20,000</u>
Projected pounds of production at full capacity	<u>60,000</u>	<u>48,000</u>	<u>12,000</u>	<u>120,000</u>

b. 2.

Lond Co.
DIFFERENTIAL REVENUES (EXCLUDING RETA)
For the Year Ending December 31, 1990

Increase in sales of Jana at full capacity		
Projected sales for 1990 (60,000 pounds @ \$3.40)	\$204,000	
Sales of Jana for 1989 (50,000 pounds @ \$4.00)	<u>200,000</u>	\$4,000
Decrease in sales of Bynd at full capacity		
Projected sales for 1990 (12,000 pounds @ \$0.90)	\$ 10,800	
Sales of Bynd for 1989 (10,000 pounds @ \$1.10)	<u>11,000</u>	<u>200</u>
Net increase in sales (excluding Reta)		<u>\$3,800</u>

b. 3.

Lond Co.
DIFFERENTIAL COSTS
For the Year Ending December 31, 1990

Joint [(120,000 – 100,000) × (\$88,000/100,000)]*	\$17,600
Reta [(48,000 – 40,000) × (\$120,000/40,000)]*	24,000
Bynd [(12,000 – 10,000) × (\$3,000/10,000)]*	<u>600</u>
Increase in differential costs	<u>\$42,200</u>

*Increase in pounds produced × 1989 variable cost per pound produced.

b. 4.

Lond Co.
**SALES PRICE REQUIRED PER POUND OF RETA IN 1990
TO ACHIEVE TOTAL 1989 GROSS MARGIN**

Sales of Reta for 1989	\$300,000
Projected 1990 net increase in differential costs (\$42,200 cost increase – \$3,800 sales increase)	<u>38,400</u>
Recovery required from Reta	<u>\$338,400</u>
Sales price required per pound of Reta \$338,400/48,000 = <u>\$7.05</u>	

**PROOF
(Not Required)**

	<u>Jana</u>	<u>Reta</u>	<u>Joint</u>	<u>Total</u>
Projected 1990 sales	<u>\$204,000</u>	<u>\$338,400</u>		<u>\$542,400</u>
Fixed costs		90,000	\$148,000	238,000
Variable costs (20% higher than in 1989)		144,000	105,600	249,600
Less Bynd's net realizable value (\$10,800 – 2,000 – 3,600)				<u>(5,200)</u>
Total costs				<u>482,400</u>
Gross margin (1990 and 1989)				<u>\$ 60,000</u>

NUMBER 8

1.	Beginning accounts payable - materials		\$40,000
	Purchases of materials required for production:		
	Units produced	70,000	
	Materials cost per unit	<u>x \$3</u>	
		\$210,000	
	Change in inventory	<u>-0-</u>	<u>210,000</u>
			\$250,000
	Less: one week usage * (\$210,000 / 10 weeks)		- <u>21,000</u>
	Payments for materials		<u>\$229,000</u>

* Manufacturing occurs evenly over the 10 week period and materials are paid for in the week following usage.

2.	Selling price per unit		\$ 11
	Less Variable costs:		
	Materials	\$ 3	
	Conversion costs	2	
	Selling and administrative cost	<u>1</u>	<u>6</u>
	Contribution margin per unit		\$ 5
	# units produced and sold		x <u>70,000</u>
	Total contribution margin		\$ <u>350,000</u>
	Less fixed costs:		
	Conversion	\$210,000	
	Selling and administration	<u>45,000</u>	<u>255,000</u>
	Budgeted variable costing net income		\$ <u>95,000</u>

3. If there is no change in inventory (production equals sales), net income using Absorption Costing will be the same as net income using Direct Costing (Variable Costing). Therefore, budgeted net income using Absorption Costing is \$95,000.

4.	Net income under Direct Costing:		
	# units sold		60,000
	Contribution margin (refer to #2)		<u>x \$5 / unit</u>
	Total contribution margin		\$300,000
	Less fixed cost (refer to #2)		<u>255,000</u>
	Net income—direct costing		\$ 45,000
	Add: Fixed costs included in inventory		
	Increase in inventory	10,000 units	
	F.C. / unit (\$255,000 / 70,000 units)	<u>\$3</u>	<u>30,000</u>
	Net income under Absorption Costing		\$ 75,000
	Budgeted net income under Absorption Costing		<u>95,000</u>
	Difference		\$ <u>20,000</u>

Net income under Absorption Costing will differ from that under Direct Costing by the amount of fixed costs assigned to the increase or decrease in inventory. If inventory increases, fixed costs are transferred to the following period, thereby increasing net income under Absorption Costing. If inventory decreases, fixed costs from prior periods are expensed, thereby reducing net income under Absorption Costing.

5. To not reduce net income, revenue from the special order (#4000 units) must equal the variable costs of the special order plus the contribution margin from the loss of regular sales (#1000 units).

Variable costs of special order	
4000 units @ \$6 (refer to #2)	\$24,000
Less contribution on regular sales	
1000 units @ \$5 (refer to #2)	<u>5,000</u>
Minimum revenue on special order	<u>\$29,000</u>

Chapter Fourteen

Managerial Planning and Control

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Chapter Fourteen

Managerial Planning and Control

COMPOUND INTEREST COMPUTATIONS

Computations involving compound interest may be necessary in any problem in which money is to be paid or received in different periods of time, such as with leases, bonds, pensions, investments, notes receivable and payable, contracts, and capital budgeting, to name only a few examples. For this reason, the candidate must have a thorough understanding of the concepts and the time value of money.

Compound Value of a Single Sum (Future Value)

If \$1.00 is invested today in a savings account that pays five percent interest compounded annually, what amount will be on deposit at the end of two years if all monies are left on deposit?

Compound interest is interest for the period computed on the original principal plus the interest accumulated to the beginning of the interest period.

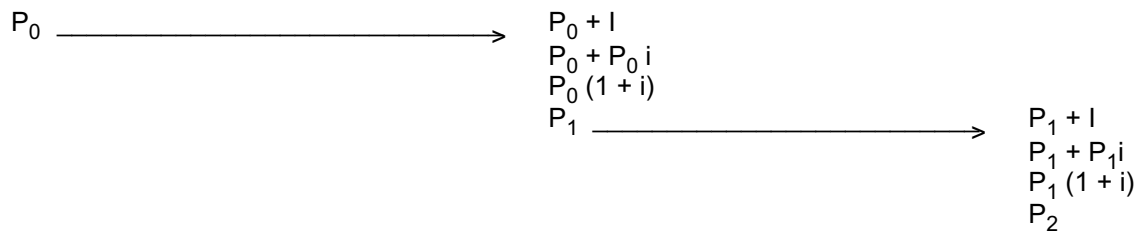
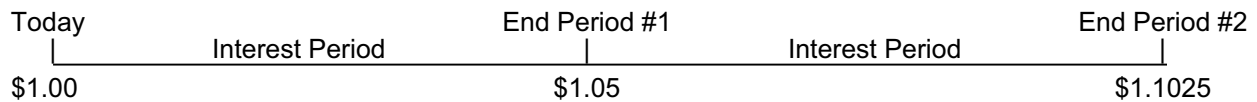
The amount on deposit at the end of two years can be determined as follows:

<i>Period</i>	<i>Beginning Principal</i>	+	<i>Interest</i>	=	<i>Ending Balance</i>
1	\$1.00	+	(\$1.00 × .05)	=	\$1.05
2	1.05	+	(\$1.05 × .05)	=	1.1025

To develop a general formula for the compound value of a single sum, the following terms will be used:

- P = Principal
- I = Interest
- i = Interest rate
- n = Number of periods
- FV = Future value

Using these terms, the solution to the above problem may be illustrated as follows:



Note that the P_2 is determined as follows:

$$P_2 = P_1 (1 + i) = P_0 (1 + i) (1 + i) = P_0 (1 + i)^2$$

Using the information from the original problem, the compound value at the end of the second year is calculated as follows:

$$P_2 = P_0 (1 + i)^2 = \$1 (1 + .05)^2 = \$1 (1.1025) = \mathbf{\$1.1025}$$

If the amount on deposit at the end of the second year were left on deposit for one more year, what would be the value on deposit at the end of the third year? Another year's interest would be earned. Therefore, the value at the end of the third year (P_3) would be $(1 + i)$ times the value at the end of the second year (P_2).

$$P_3 = P_2 (1 + i) = P_1 (1 + i)(1 + i) = P_0 (1 + i)(1 + i)(1 + i) = P_0 (1 + i)^3$$

For the original problem, the value at the end of the third year is determined as follows:

$$P_3 = P_0 (1 + i)^3 = \$1 (1 + .05)^3 = \$1 (1.1576) = \mathbf{\$1.1576}$$

It should now be evident that the formula for the future value (compound value) of a single sum for n interest periods is:

$$\underline{\underline{FV_n = P_0(1+i)^n}}$$

This is the **fundamental formula of compound interest**, upon which the other formulae in this section will be based. Therefore, it is important that you understand its derivation. To assist in the application of this formula, tables of the compound value interest factor $(1 + i)^n$ have been constructed for various values of i and n (refer to Appendix A, Table 1—Compound Value of \$1). Using these factors, it is only necessary to multiply the principal (P_0) by the appropriate interest factor for the given i and n values, to determine the future value. The fundamental formula may now be written as:

$$FV = P_0 (IF)$$

Example: If \$1,000 is invested for 5 years at 6% interest compounded annually, what will its value be at the end of 5 years?

To determine the appropriate interest factor from Table 1, first locate the 6% column, then read down the values of the column to the $n=5$ row. This factor is 1.338. The future value is then determined as follows:

$$\begin{aligned} FV &= P(IF) \\ &= \$1,000(1.338) \\ &= \underline{\underline{\$1,338}} \end{aligned}$$

Present Value of a Single Sum

Money has a time value. A dollar received today has a greater value than a dollar to be received one year from today because of the interest which it can earn. The value today of a dollar to be received one year from today can be no greater than the amount which invested at an appropriate interest rate will have a future value equal to a dollar. Therefore, given an interest rate greater than zero, the value today of a dollar received in the future must be less than a dollar. Under present value concepts a dollar to be received at some future date is made comparable to a dollar today by discounting.

Discounting is the reverse of compounding—the inherent interest in a future value is removed to determine the original principal. The present value (discounting) formula is developed from the fundamental compound value formula.

$$FV = P_0 (1+i)^n$$

$$P_0 = \frac{FV}{(1+i)^n}$$

$$P_0 = FV \times \frac{1}{(1+i)^n}$$

The present value may be identified as PV or P_0 as the subscript zero in the term P_0 indicates the present.

Example: Previously we determined that the future value of \$1 at 5% compounded annually for two years was \$1.1025. Conversely, we can state that the present value of \$1.1025 at 5% compounded annually for two years is \$1. This is computed as follows:

$$PV = FV \times \frac{1}{(1 + i)^n}$$

$$PV = \$1.1025 \times \frac{1}{(1.05)^2}$$

$$PV = \$1.1025 \times \frac{1}{1.1025}$$

$$PV = \underline{\underline{\$1.00}}$$

To assist in the application of the present value formula, tables of the present value interest factor $1/(1 + i)^n$ have been constructed for various values of i and n (refer to Appendix A, Table 2—Present Value of \$1). Using these factors, it is only necessary to multiply the future value by the appropriate interest factor for the given i and n values, to determine the present value. The present value formula may now be written as:

$$PV = FV (IF)$$

Example: What is the present value of \$1,216 to be received four years from today at 5% compounded annually?

To determine the appropriate interest factor from Table 2, first locate the 5% column, then read down the values of the column to the $n=4$ row. This factor is .82270. The present value is now determined as follows:

$$PV = FV (IF)$$

$$PV = \$1,216 (.8227)$$

$$PV = \underline{\underline{\$1,000.40}}$$

Proof: $FV = P_0 (IF)$ (FV interest factor)

$$FV = \$1,000.40 (1.216)$$

$$FV = \$1,216.48$$

(The difference is due to rounding in the construction of the tables.)

Compound Value of an Annuity (Future Value)

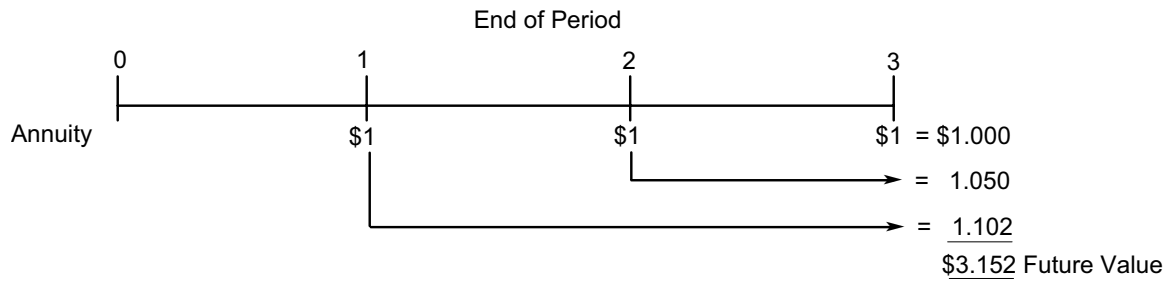
An annuity is a **series** of **equal** payments for a specified number of periods. There are two types of annuities:

- **Ordinary Annuity**—payments are made at the end of the period. Also called deferred annuity or annuity in arrears.
- **Annuity Due**—payments are made at the beginning of the period.

The concepts and techniques of compound interest and future value at the same for an annuity as for a single sum. Refer to compound value of a single sum for their review.

Ordinary Annuity: If \$1 is invested at the end of each year for three years in a savings account that pays 5% compounded annually, what amount will be on deposit at the end of the three years?

The amount on deposit at the end of the third year is equal to the sum of the future values of the three ordinary annuity payments. The answer is illustrated graphically as follows:



Computation of future value:

<u>Payment</u>	<u>Amount</u>	<u>Interest Periods</u>	<u>FV =</u>	<u>P(1+i)ⁿ</u>
1.	\$1.00	2	$\$1(1.05)^2 =$	$\$1(1.102) =$ \$1.102
2.	1.00	1	$1(1.05)^1 =$	$1(1.050) =$ 1.050
3.	1.00	0	$1(1.05)^0 =$	$1(1.000) =$ 1.000
			<u>$\\$1(3.152) =$</u>	<u>\$3.152</u>

Note:

- For the third payment, $(1+i)^0 = 1$.
- The total of the interest factors $(1+i)^n$ times the annuity equals the future value ($\$1 \times 3.152 = \3.152).

It is not necessary to compute each future value and sum them up. Rather, the total of the factors may be used to compute the future value of the annuity.

Expressed algebraically, the formula for the future value of an ordinary annuity is:

$$FV = A \sum_{m=1}^n (1+i)^{n-m}$$

(R, read sigma, means summation)

\sum

In the expression $\sum_{m=1}^n (1+i)^{n-m}$, m (a counter) begins at 1 because the first annuity payment earns interest for one less period than there are periods (n), and goes to n (shown above Σ) because the last payment earns no interest ($n - m = 0$).

\sum

To assist in the application of this formula, tables of the compound value interest factor $\sum_{m=1}^n (1+i)^m$ have been constructed for various values of i and n (refer to Appendix A, Table 3—Compound Value of an Annuity of \$1). Using these factors, it is only necessary to multiply the Annuity (A) by the appropriate interest factor for the given i and n values to determine the future value of an ordinary annuity. The future value of an ordinary annuity formula may now be written as:

$$FV = A(IF)$$

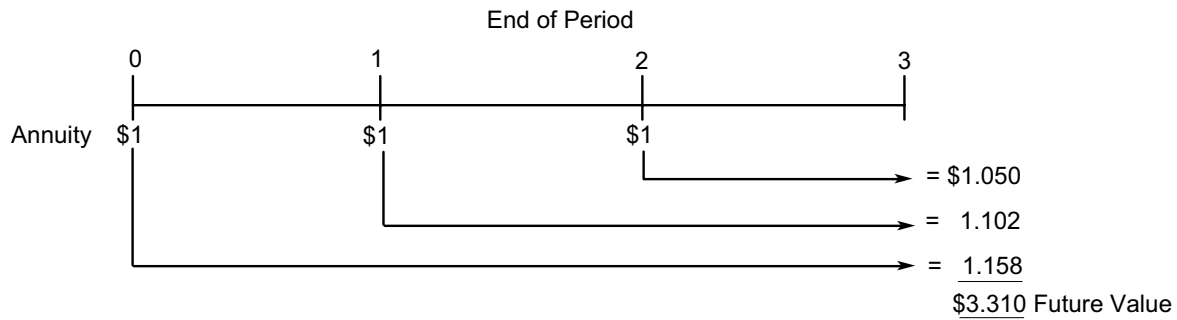
Example: What is the future value of an ordinary annuity of \$1,000 per year for 6 years at 7% compounded annually?

To determine the appropriate interest factor from table 3, first locate the 7% column, then read down the column of values to the n=6 row. This factor is 7.153. The future value of the ordinary annuity is determined as follows:

$$\begin{aligned} FV &= A(IF) \\ &= \$1,000(7.153) \\ &= \$7,153 \end{aligned}$$

Annuity Due: If \$1 is invested at the beginning of each year for 3 years in a savings account that pays 5% compounded annually, what amount will be on deposit at the **end** of the third year?

The amount on deposit at the end of the third year is equal to the sum of the future value of the three annuity due payments. The answer is illustrated graphically as follows:



Computation of future value:

<i>Payment</i>	<i>Amount</i>	<i>Interest Periods</i>	$FV = \frac{P(1+i)^n}{i}$
1.	\$1.00	3	$\$1(1.05)^3 = \$1(1.158) = \$1.158$
2.	1.00	2	$1(1.05)^2 = 1(1.102) = 1.102$
3.	1.00	1	$1(1.05)^1 = 1(1.050) = 1.050$
			$\$1(3.310) = \3.310

Note that the total of the interest factors $(1+i)^n$ times the annuity equals the future value ($\$1 \cdot 3.310 = \3.31). As with the ordinary annuity it is not necessary to compute each future value and sum them up. The total of the factors may be used to compute the future value of the annuity.

Expressed algebraically, the formula for the future value of an ordinary annuity is:

$$FV = A \sum_{m=0}^{n-1} (1+i)^{n-m}$$

Here m begins at 0 because the first payment earns interest for each of the periods (n) and goes to n-1 because there is no payment at the end of the nth period.

Tables of the compound value interest factor for an annuity due $\left[\sum_{m=0}^{n-1} (1+i)^{n-m} \right]$ are usually not available;

however, the tables of the compound interest factor for an ordinary annuity can be adapted to show the interest factors of an annuity due. **This is accomplished by taking the factor for the period one greater than the actual period of the annuity (n+1) and subtracting 1 from this interest factor.** The reasons for this are:

- Each annuity due payment earns interest for one more period than an ordinary annuity payment, and
- There is no annuity due payment at the end of the last period such as there is in an ordinary annuity — $(1 + i)^0 = 1$

Example: What is the future value of an annuity due of \$1,000 for 4 years at 7% compounded annually?

To determine the appropriate interest factor from Table 3, first locate the 7% column, then read down the column of figures to the n=5 row (4 years + 1). The factor is 5.751. The future value of the annuity due is determined as follows:

$$\begin{aligned}
 FV &= A (IF) \\
 &= \$1,000 (5.751 - 1) \\
 &= \$1,000 (4.751) \\
 &= \$4,751
 \end{aligned}$$

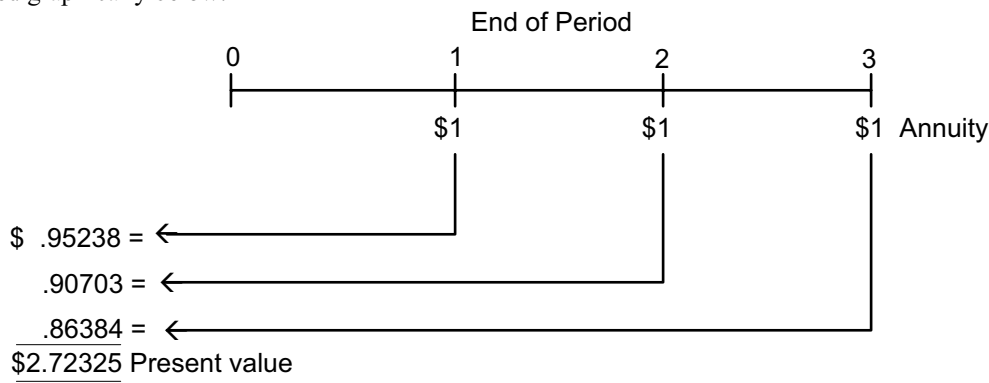
To determine if an annuity table of compound value interest factors is for an ordinary annuity or an annuity due, you must **analyze the factor for the first period**. An annuity for one period is the same as a single sum. If the factor is 1.000 it shows that no interest has been earned at the end of the period; therefore, the amount must have been paid at the end of the period and is an ordinary annuity. If the factor is greater than 1.000, it shows that interest has been earned by the end of the period; therefore, the amount must have been paid at the beginning of the period and the annuity is an annuity due.

Present Value of an Annuity

The concepts and techniques of discounting are the same for an annuity as for a single sum. Refer to present value of a single sum for their review.

Ordinary Annuity: What is the present value of a three year ordinary annuity of \$1 per year discounted at 5% compounded annually?

The present value is equal to the sum of the present values of the individual annuity payments. The answer is illustrated graphically below:



Computations of present value:

<i>Payment</i>	<i>Amount</i>	<i>Discount Periods</i>	$PV = \frac{FV}{(1+i)^n}$
1.	\$1	1	$\$1 \times \frac{1}{(1.05)^1} = \$1(.95238) = .95238$
2.	\$1	2	$\$1 \times \frac{1}{(1.05)^2} = 1(.90703) = .90703$
3.	\$1	3	$\$1 \times \frac{1}{(1.05)^3} = \frac{1(.86384)}{1(2.72325)} = \underline{\underline{.86384}}$

Note that the total of the interest factors $1 \div (1+i)^n$ times the annuity equals the present value of the annuity ($\$1 \times 2.72325 = \2.72325). As with the compound value of an annuity, it is not necessary to compute the value of each annuity payment and sum them up. The total of the interest factors may be used to compute the present value.

The formula for the present value of an ordinary annuity is:

$$PV = A \times \sum_{m=0}^{n-1} \frac{1}{(1+i)^{n-m}}$$

This formula is basically the reciprocal of the compound value of an annuity formula. However, m begins at 0 because the last payment is discounted for n periods and goes through $n-1$ because there is no payment at the beginning of the first period ($n-m = 0$).

To assist in the application of this formula, tables of the present value interest factor for an ordinary annuity have been constructed for various values of i and n (refer to Appendix A, Table 4—Present Value of an Annuity of \$1). Using these factors, it is only necessary to multiply the annuity (A) by the appropriate interest factor for the given i and n values to determine the present value of ordinary annuity. The present value formula of an ordinary annuity now becomes:

$$PV = A(IF)$$

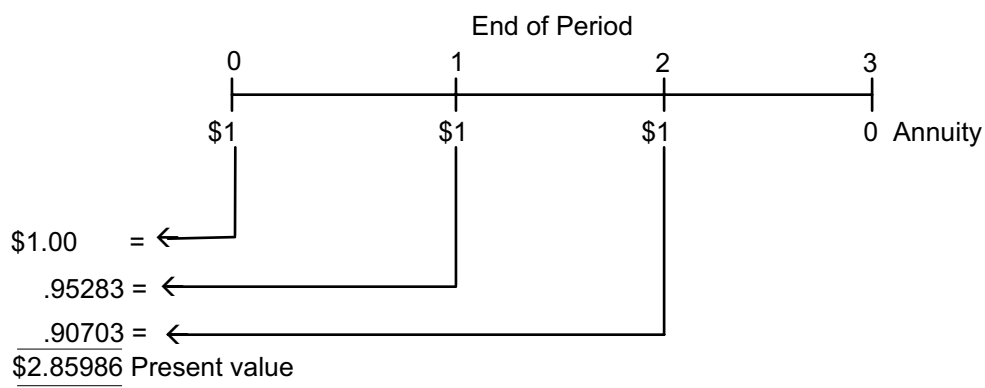
Example: What is the present value of an ordinary annuity of \$1,000 per year for 6 years at 7% compounded annually?

To determine the appropriate interest factor from Table 4, first locate the 7% column; then read down the values of the column to the $n = 6$ row. The factor is 4.7665. The present value is now determined as follows:

$$\begin{aligned} PV &= A(IF) \\ &= \$1,000(4.7665) \\ &= \underline{\underline{\$4,766.50}} \end{aligned}$$

Annuity Due: What is the present value of a three year annuity due of \$1 discounted at 5% compounded annually?

The present value is equal to the sum of the present values of the individual payments. The answer is illustrated graphically below.



Computations of present value:

<u>Payment</u>	<u>Amount</u>	<u>Discount Periods</u>	$PV = FV \times \frac{1}{(1+i)^n}$
1.	\$1	0	$\$1 \times \frac{1}{(1.05)^0} = \$1 \times 1.000 = \$1.00$
2.	\$1	1	$\$1 \times \frac{1}{(1.05)^1} = \$1 \times .95283 = .95283$
3.	\$1	1	$\$1 \times \frac{1}{(1.05)^2} = \frac{\$1 \times .90703}{\$1 \times 2.85986} = \frac{.90703}{2.85986}$

Note that the total of the interest factors times the annuity equals the future value ($\$1 \times 2.85986 = \2.85986). As with the ordinary annuity it is not necessary to compute the present value of each annuity payment and sum them up. The total of the interest factors may be used to compute the present value.

The formula for the present value of an annuity due is:

$$PV = A \times \sum_{m=1}^n \frac{1}{(1+i)^{n-m}}$$

Here m begins at 1 because the last payment is discounted for n-1 periods and goes through n because the first payment is at the beginning of the first period (n-m = 0).

Tables of the present value interest factor for an annuity due are usually not available; however, the tables of the present value factors for an ordinary annuity can be adapted to show the interest factors of an annuity due. **This is accomplished by taking the factor for the period one less than the actual period of the annuity (n-1) and adding 1 to this interest factor.** The reasons for this are:

- Each annuity due payment is discounted for one less period than an ordinary annuity payment and
- There is an annuity due payment at the beginning of the first period [$1 \div (1+i)^0 = 1$] which does not exist in an ordinary annuity.

Example: What is the present value of an annuity due of \$1,000 per year for 4 years at 7% compounded annually?

To determine the appropriate interest factor from table 4, first locate the 7% column; then read down the column values to the n = 3 row (4 years-1). The factor is 2.6243. The present value is now determined as follows:

$$\begin{aligned} PV &= A (IF) \\ &= \$1,000 (2.6243 + 1) \\ &= \$1,000 (3.6243) \\ &= \underline{\underline{\$3,624.30}} \end{aligned}$$

To determine if an annuity table of present value interest factors is for an ordinary annuity or an annuity due, you must **analyze the first period factor**. If the factor is smaller than 1.000, it shows that interest has been removed; therefore, the amount must have been paid at the end of the period and it is an ordinary annuity. If the factor is 1.000, it shows that no interest was removed; therefore, the amount must have been paid at the beginning of the first period and it is an annuity due.

Exercises (Ignore the effects of income taxes in the following exercises.)

1. Approximately how long will it take for an investment to double given a growth rate of: a) 5%, b) 7%, and c) 12%?
2. A client has just won \$5,000 from the Massachusetts State Lottery. If he invests this money now at 10% compounded annually, how much will he have at the end of 10 years?
3. You have determined that \$10,000 will be needed in four years for the acquisition of new office machinery. How much money must you invest today at 9% compounded annually to provide this amount in four years?
4. Your client invested in a stock 10 years ago which cost \$5 per share. This stock is now selling for \$12.97 a share. The client would like to know at what rate of interest his investment has grown.
5. The Ryder Company is establishing a sinking fund to retire a mortgage that matures on December 31, 19X9. The first payment will be made on December 31, 19X0, and the last payment will be made on December 31, 19X9. Each payment will amount to \$30,000 and the company anticipates that the sinking fund will earn 8% compounded annually. After the last payment is made, what will be the balance of the fund?
6. On January 2, 19X1, your client issued 5 year, 5% bonds payable with a face value of \$1,000,000. These bonds pay interest semiannually on June 30 and December 31 of each year. What were the proceeds from this issuance if the bonds were sold to yield 8% compounded semi-annually?
7. On January 2, 19X2, your client entered into a lease for machinery which was in substance a purchase. The lease provided for four annual rental payments of \$4,000 each. The first payment was due January 2, 19X2. At what amount should the machinery be recorded on the client's books if the lease is capitalized, and 10% is an appropriate rate of interest for such transactions?
8. Your client has recently deposited \$20,000 in a savings account which pays 8% interest compounded annually. He plans to withdraw a constant amount each year for 10 years, so that at the end of the 10th year the balance will be zero. How much may he withdraw at the end of each year?
9. You plan to invest \$500 of your salary, at the beginning of each year, for the next 10 years. If your investment will earn 10% compounded annually, what amount **will you have at the end of the 15th year?**

Solutions to Exercises:

1. (a) 14+, (b) 10+, (c) 6+, Table 1, Compound value factor of 2.00.
 2. $FV = P \times FVF = \$5,000 \times 2.594 = \underline{\$12,970}$ (Table 1)
 3. $PV = FV \times PVF = \$10,000 \times .70843 = \underline{\$7,084.30}$ (Table 2)
 4. $PV = FV \times PVF \quad \$5 = 12.97 \times PVF \quad PVF = \$5 \div 12.97 = .385505 = \text{Factor for } \underline{10\%} \text{ and } 10N \text{ Table 2}$
or
 $FV = PV \times FVF \quad 12.97 = 5 \times FVF \quad FVF = 12.97 \div 5 = 2.594 = \text{Factor for } \underline{10\%} \text{ and } 10N \text{ Table 1}$
 5. $FV = A \times FVF = \$30,000 \times 14.487 = \underline{\$434,610}$ Table 3, Ordinary Annuity
 6. $PV = FV \times PVF = \$ 25,000 \times 8.1109 = \quad \underline{\$202,772.50}$ Table 4
+ $PV = A \times PVF = \$1,000,000 \times .67556 = \quad \underline{\$675,560.00}$ Table 2
PV of Bond \$878,332.50
- Note:** Both maturity value and semi-annual interest payments are discounted at the yield rate 8% compounded semi-annually (4%, 10N).
7. $PV = A \times PVF = \$4,000 \times 3.4868 = \underline{\$13,947.20}$ Table 4
Adjusted for annuity due (N-1, + 1.00)

$$8. \quad PV = A \times PVF \quad \$20,000 = A \times 6.7101 \quad A = \$20,000 \div 6.7101 = \$2,980.58$$

$$9. \quad FV = A \times FVF = \$500 \times 17.531 = \$8,765.50 \text{ @ EOY\#10,}$$

Table 3 adjusted for annuity due (N + 1, - 1.00)

$$FV = PV \times FVF = \$8,765.50 \times 1.611 = \underline{\underline{\$14,121.22}} \text{ EOY \#15}$$

CAPITAL BUDGETING

Capital budgeting is the process of planning capital expenditures—expenditures the benefits of which will be realized over a period longer than a year rather than in the current year (revenue expenditures).

Capital budgeting involves the:

1. generation of investment proposals
2. determination of investment benefits (profits and cash flow)
3. evaluation of investment benefits
4. ranking of investment proposals for decision purposes, based on their evaluation

The technique employed in the evaluation is of primary importance because the different techniques do not always result in the same ranking of investment alternatives. The ranking of investment proposals is necessary because firms usually have more potential capital expenditure proposals than they are capable of or willing to finance.

Capital Budgeting Techniques

1. Payback Method
2. Unadjusted Rate of Return Method (Accounting Method)
3. Discounted Cash Flow Methods
 - a. Internal Rate of Return
 - b. Net Present Value

Payback Method

Investments are ranked according to the length of time required to generate cash flows equal to their cost. The payback period is computed as:

$$\text{Payback Period} = \frac{\text{Cost of Investment}}{\text{Annual Cash Flows}}$$

The payback method is frequently used in practice because:

- it is easy to understand and apply.
- when estimates of profitability are not crucial because of a weak cash or credit position, the enterprise must look to a rapid return of its funds.

The payback method is theoretically unacceptable because:

- it ignores the time value of money
- it ignores profitability of the project
- it ignores cash flows beyond the payback period
- it is a measurement of liquidity, not profitability.

Example: Compute the payback period for an investment of \$100,000 which generates an annual cash flow of \$25,000.

Solution:

$$\text{Payback period} = \frac{\text{Investment cost}}{\text{Annual cash flow}} = \frac{\$100,000}{25,000} = \underline{4} \text{ years}$$

Unadjusted Rate of Return Method

Investments are ranked according to the ratio of the expected average net income to either the original investment or the average investment of the project. The unadjusted rate of return is computed as:

$$\text{Unadjusted Rate of Return} = \frac{\text{Average Annual Net Income}}{\text{Investment or Average Investment}}$$

The attributes of this method are:

- it is easy to apply
- it is easily understood by persons familiar with ratio analysis
- it considers the profitability of the project over its entire life.

This method is theoretically unacceptable because **it ignores the time value of money.**

Example: Compute the accounting rate of return for an investment of \$70,000 which generates gross annual cash flows of \$22,000, and is expected to have a useful life of 10 years. The tax rate is 40%.

Solution:

(a) Determination of annual net income from project

Annual cash flow	\$22,000
Less depreciation	<u>7,000</u>
Annual income before taxes	\$15,000
Taxes (40%)	<u>6,000</u>
Annual net income	\$ 9,000

$$(b) \text{ Accounting Rate of Return} = \frac{\text{Average Annual Net Income}}{\text{Investment}} = \frac{\$ 9,000}{\$70,000} = \underline{12.9\%}$$

Note: If average cost of the project were used, the computation would be $\$9,000 \div \$35,000$ ($\$70,000 \times 1/2$) or 25.8%. If all projects are computed in the same manner, i.e., either using the original investment or average investment, their relative ranking will be the same.

Discounted Cash Flow Methods

The discounted cash flow methods of capital budgeting are the theoretically correct methods of capital budgeting as they explicitly consider the time value of money. In the determination of time value of money and the application of these methods, there are two important elements. **First** is the cash flow to be paid or received in a given period of time. For capital expenditure proposals, there are two distinct cash flows: the investment and the investment's benefits. Discounted cash flow methods of capital budgeting require reliable estimates of the investment's cash flows, for the results of these methods can be no more reliable than the data upon which they are based. The emphasis is upon cash flow rather than profit because money is the resource which is invested and reinvested to yield return to the enterprise. **Second** is the cost of capital for the enterprise. The cost of capital is the minimum rate of return which the firm must earn in order to fulfill the expectations of those who provide the firm's capital (creditors and owners) and maintain its present valuation. The cost of capital used in the discounted cash flow techniques is the marginal cost of capital (a weighted average cost of the last dollar of capital raised).

Internal Rate of Return Method

Investments are ranked according to their projected rate of return. Projects with an internal rate of return less than the desired rate of return (usually the cost of capital) should normally be rejected. The internal rate of return of an investment is that **discount rate which equates the present value of the benefits to be received (cash flows) from the investment with the cost of the investment (initial cash outlay).** The internal rate of return is found by trial and error or interpolation.

Example: Compute the internal rate of return for an investment of \$100,000 which generates net annual cash flows of \$20,000 and is expected to have a useful life of 10 years.

Solution:

$$\begin{aligned} \text{P.V. Investment} &= \text{P.V. Benefits} \\ \$100,000 &= \$20,000 (\text{IF}) \\ \frac{\$100,000}{20,000} &= \text{IF} \\ 5 &= \text{IF} \end{aligned}$$

Referring to Appendix A, Table 4 (Present Value of an Annuity of \$1), reading the values of the n = 10 row we find:

$$\begin{aligned} \text{P.V. of \$1 for ten periods at 15\%} &= 5.0188 \\ \text{P.V. of \$1 for ten periods at 16\%} &= 4.8332 \end{aligned}$$

Therefore, the internal rate of return is approximately 15%.

Net Present Value

Investments are ranked according to their net present value which is defined as the present value of the cash flows of an investment, **discounted at the cost of capital**, less the cost of the investment (initial cash outlay). Investments with a net present value equal to or greater than zero should be accepted because they are earning a rate of return equal to (NPV = 0) or greater than (NPV > 0) the minimum required rate of return (the cost of capital).

Example: Compute the net present value of the investment in the previous example assuming the cost of capital is 10%.

Solution:

Present value of benefits = A (IF) = \$20,000 × 6.1446 =	\$122,892
Less: Present value of investment	<u>100,000</u>
Net Present Value	\$ 22,892

Profitability Index

Investments are ranked according to the ratio of the present value of the benefits (discounted at the cost of capital) to the investment. Investments with a profitability index equal to or greater than 1 should normally be accepted as they are earning a rate of return equal to (PI = 1) or greater than (PI > 1) the cost of capital.

Example: Compute the profitability index for the previous example.

Solution:

$$\text{Profitability index} = \frac{\text{Present Value of Benefits}}{\text{Investment}} = \frac{\$122,892}{100,000} = \underline{\underline{1.23}}$$

Illustrative Problem

Investalot Corporation is considering the purchase of a new machine which will cost \$106,111. Freight charges and installation costs are anticipated to be \$5,000. Management estimates that variable costs will be reduced by \$16,000 per year and that additional revenues of \$14,000 per year will be generated if this machine is purchased. The machine has an estimated useful life of 10 years and will have a \$15,000 salvage value. Investalot Corporation computes depreciation on the straight line basis, has an effective tax rate of 40% and a 15% cost of capital. If Investalot Corporation purchases this new machine it will trade in an old, idle machine, receiving a trade-in allowance equal to its book and fair value of \$11,111. Should the company buy this machine?

Solution:

• Investment—initial cash outlay

Purchase price	\$106,111
Add: Freight and installation	<u>5,000</u>
Depreciable cost	\$111,111
Less trade-in allowance	<u>- 11,111</u>
Initial cash outlay	<u>\$100,000</u>

• Benefits—Annual Cash Flows

a. For years 1 through 10

Additional revenues	\$14,000
Reduction in variable costs	<u>16,000</u>
	\$30,000
Less depreciation (\$111,111 - 15,000 = 96,111 × 10%)	<u>9,611</u>
Increase in net income before taxes	\$20,389
Less: Taxes @ 40%	<u>8,156</u>
Increase in net income after taxes	\$12,233
Add: depreciation	<u>9,611</u>
Additional annual cash flows	<u>\$21,844</u>

b. For the 10th year

In addition to the annual cash flows	
Investalot will receive the salvage value	<u>\$15,000</u>

• Assuming use of the Net Present Value Method

Present value of annuity—10 years @ 15%	$\$21,844 \times 5.0188 = \$109,631$
Present value of a single sum—10th year @ 15%	$\$15,000 \times .2472 = \underline{3,708}$
Present value of benefits	\$113,339
Less: Present value of investment	<u>100,000</u>
Net present value	<u>\$ 13,339</u>

Investalot Corporation should purchase the new machine as the net present value is equal to or greater than zero.

• Assuming use of the Internal Rate of Return Method

To use interpolation the present value is needed at two rates such that one is above and the other below the present value of the investment. The present value at 20% is computed as follows:

Present value of annuity	$\$21,844 \times 4.1925 = \$91,581$
Present value of single sum	$\$15,000 \times .1615 = \underline{2,423}$
Present value of benefits @ 20%	<u>\$94,004</u>

<u>Discount Rate</u>	=	<u>Present Value</u>	
15%	=	\$113,339	
IRR	=	100,000	(Investment Cost)
20%	=	94,004	

Interpolation may now be used to determine the internal rate of return. A 5 percent change in the discount rate (15% to 20%) resulted in a change of \$19,335 in the present value (\$113,339 to \$94,004). What is needed is some percentage change from 15 percent such that the change in present value will be \$13,339 (\$113,339 - \$100,000). This percentage change is computed as follows:

$$\frac{.05}{\$19,335} = \frac{X}{\$13,339}$$

(5% is to \$19,335 as X is to \$13,339)

$$\begin{aligned} \$19,335 X &= \$666.95 \\ X &= \frac{666.95}{\$19,335} \\ X &= .034 \end{aligned}$$

The internal rate of return is approximately 18.4% (15% + 3.4%).

BUDGETING

A budget may be defined as a **plan for future operations expressed in dollars or units or both**. Its purpose is to show the results of future operations given the goals, policies, forecasts and standards of operations. Budgeting may also be referred to as a **managerial tool for profit planning and control**, as actual results of operation may be compared with budgeted results of operations to identify problem areas. The budgeting process is of the utmost importance in the successful management of complex business enterprises and necessarily embodies the consensus of top management concerning the future direction of the enterprise.

The budgeting process requires decisions which result in commitments critical to the financial success of the enterprise such as:

1. Expected sales levels (short and long run)
2. Individual product sales
3. Inventory levels by product
4. Production schedules to meet inventory levels
5. Purchasing of materials and supplies
6. Personnel to carry out planned activity level
7. Capital expenditures required to meet production
8. Cash balances required to carry out planned activities

Sales Budget

The first step in the budgeting process (given the goals and policies of operation) is to forecast the level of sales for the budget period. Consideration must be given to general economic conditions, the company's pricing policy, expected sales effort, past sales levels, the company's relative market position, the trend of acceptance for the company's products, etc. The sales budget should be broken down by geographic locations, product lines and sales entities to facilitate the control function of budgeting.

Inventory Budget

After the sales budget has been prepared, the inventory levels needed to meet sales and conform to company policy may be determined. This budget would be broken down by storage areas and product lines to facilitate control.

Example: Assume sales levels by month as follows:

January	\$ 900,000
February	1,200,000
March	1,000,000
April	1,500,000

Company policy is to maintain inventory levels at 30% of the cost of goods sold of the **following** month. All products are sold at a mark-up of 25% of cost. Compute the inventory levels at the end of January, February and March.

Solution:

Step 1. Compute the cost of goods sold for February, March and April.

Cost	100%
Mark-up	<u>25%</u>
Selling price	125%

Cost as a percent of selling price = $100 \div 125 = 80\%$

Cost of goods sold for:

February	$\$1,200,000 \times 80\% = \$ 960,000$
March	$\$1,000,000 \times 80\% = \$ 800,000$
April	$\$1,500,000 \times 80\% = \$1,200,000$

Step 2. Compute the ending inventory for January, February and March.

January	$\$ 960,000 \times 30\% = \underline{\underline{\$288,000}}$
February	$800,000 \times 30\% = \underline{\underline{\$240,000}}$
March	$1,200,000 \times 30\% = \underline{\underline{\$360,000}}$

Production Budget

After the required inventory levels have been determined, the production necessary to meet required inventory levels and forecast sales may be scheduled. This budget would be broken down by production facilities and product line for control purposes.

Example: Referring to the previous example, prepare a production budget for February and March, assuming that each unit costs \$10 to produce.

Solution:

Computation of February production

	<u>Cost</u>	<u>Units</u>
Beginning inventory	\$288,000	28,800
Production	<u>?</u>	<u>?</u>
Goods available for sale	\$?	?
Less: ending inventory	<u>240,000</u>	<u>24,000</u>
Cost of goods sold	<u>\$960,000</u>	<u>96,000</u>

It is evident that we can back into the production required of \$912,000 or 91,200 units as follows:

$$96,000 + 24,000 = 120,000 - 28,800 = 91,200$$

Production budget for February and March:

	<u>February</u>		<u>March</u>	
	<u>Cost</u>	<u>Units</u>	<u>Cost</u>	<u>Units</u>
Production required to meet sales budget	\$ 960,000	96,000	\$ 800,000	80,000
Add: desired ending inventory	<u>240,000</u>	<u>24,000</u>	<u>360,000</u>	<u>36,000</u>
Total production required	\$1,200,000	120,000	\$1,160,000	116,000
Less: estimated beginning inventory	<u>288,000</u>	<u>28,800</u>	<u>240,000</u>	<u>24,000</u>
Budgeted production	<u>\$ 912,000</u>	<u>91,200</u>	<u>\$ 920,000</u>	<u>92,000</u>

Raw Materials Budget

After the production budget has been prepared, the inventory levels and purchase requirements for raw materials may be determined. This budget indicates the cost (usually standard) and quantities of raw materials needed to meet production requirements and conform with company policies.

Example: Referring to the previous example, assume that each unit produced requires 2 pounds of material X and 1 yard of material Y. Management desires that these raw materials be on hand in sufficient quantities to insure uninterrupted production. Planned inventory levels of material X, which can be obtained on short notice, are 10% of the next month's production. Material Y, however, must be ordered with considerable lead time and deliveries are erratic. Therefore, it has been decided that the inventory level of material Y be maintained at 40% of the next month's production. Compute the inventory levels of raw materials X and Y at the end of January and February.

Solution:

February production = 91,200 units

March production = 92,000 units

January 31 inventory requirements:

Material X $91,200 \times 2 = 182,400 \times 10\% = \underline{18,240}$ pounds

Material Y $91,200 \times 1 = 91,200 \times 40\% = \underline{36,480}$ yards

February 28 inventory requirements:

Material X $92,000 \times 2 = 184,000 \times 10\% = \underline{18,400}$ pounds

Material Y $92,000 \times 1 = 92,000 \times 40\% = \underline{36,800}$ yards

Cash Budget

After all other budgets have been prepared (covering all aspects of the enterprise's operation), their effects on cash flows are summarized in the cash budget. The cash budget is usually broken down into monthly periods (or shorter for the very near future) showing the itemized cash receipts and disbursements during the budget period, including the financing activities and the beginning and ending cash balances.

The cash budget is usually set up as follows:

	<i>January</i>	<i>February</i>	<i>March</i>
Beginning cash balance	\$15,000	\$ 30,000	\$ 25,000
Add: cash receipts ¹	<u>60,000</u>	<u>75,000</u>	<u>100,000</u>
	\$75,000	\$105,000	\$125,000
Less: cash disbursements ¹	<u>45,000</u>	<u>80,000</u>	<u>105,000</u>
Ending cash balance	<u>\$30,000</u>	<u>\$ 25,000</u>	<u>\$ 20,000</u>

¹(These amounts would be itemized as to source or use)

The cash budget is a useful tool in the planning process for it provides management with information concerning the:

1. expected sources and uses of funds
2. availability of funds for investment purposes
3. need for external financing
4. availability of funds for the repayment of debt
5. availability of funds for distribution to owners

Pro-Forma Financial Statements

Once the budgeting process is completed through the cash budget, financial statements may be drawn up on a pro-forma basis. These statements will show the results of operation if the plans, as set forth in the budgets, are achieved. These statements will be analyzed by top management to determine if the results of planned future operations are consistent with the enterprise's objectives and goals. When conflicts are identified, the planning process begins anew.

Illustrative Problem

Modern Products Corporation, a manufacturer of molded plastic containers, determined in October 19X7 that it needed cash to continue operations. The Corporation began negotiating for a one-month bank loan of \$100,000 which would be discounted at 6 percent per annum on November 1. In considering the loan the bank requested a projected income statement and a cash budget for the month of November.

The following information is available:

1. Sales were budgeted at 120,000 units per month in October 19X7, December 19X7, and January 19X8, and at 90,000 units in November 19X7. The selling price is \$2 per unit. Sales are billed on the 15th and last day of each month on terms of 2/10 net 30. Past experience indicates sales are even throughout the month and 50 percent of the customers pay the billed amount within the discount period. The remainder pay at the end of 30 days, except for bad debts which average 1/2 percent of gross sales. On its income statement the Corporation deducts from sales the estimated amounts for cash discounts on sales and losses on bad debts.
2. The inventory of finished goods on October 1 was 24,000 units. The finished goods inventory at the end of each month is to be maintained at 20 percent of sales anticipated for the following month. There is no work in process.
3. The inventory of raw materials on October 1 was 22,800 pounds. At the end of each month the raw materials inventory is to be maintained at not less than 40 percent of production requirements for the following month. Materials are purchased as needed in minimum quantities of 25,000 pounds per shipment. Raw material purchases of each month are paid in the next succeeding month on terms of net 30 days.
4. All salaries and wages are paid on the 15th and last day of each month for the period ending on the date of payment.
5. All manufacturing overhead and selling and administrative expenses are paid on the 10th of the month following the month in which incurred. Selling expenses are 10 percent of gross sales. Administrative expenses, which include depreciation of \$500 per month on office furniture and fixtures, total \$33,000 per month.
6. The standard cost of a molded plastic container, based on "normal" production of 100,000 units per month, is as follows:

Materials—1/2 pound	\$.50
Labor	.40
Variable overhead	.20
Fixed overhead	<u>.10</u>
Total	<u>\$1.20</u>

Fixed overhead includes depreciation on factory equipment of \$4,000 per month. Over- or under- absorbed overhead is included in cost of sales.

7. The cash balance on November 1 is expected to be \$10,000.

Required:

Prepare the following for Modern Products Corporation assuming the bank loan is granted. (Do not consider income taxes.)

- a. Schedules computing inventory budgets by months for
 1. Finished goods production in units for October, November and December.
 2. Raw material purchases in pounds for October and November.
- b. A projected income statement for the month of November.
- c. A cash forecast for the month of November showing the opening balance, receipts (itemized by dates of collection), disbursements and balance at end of month.

Solution (see page 14-21).

INVENTORY PLANNING AND CONTROL

Reasons for Inventory Control

The management of inventories to achieve the needs of the business at the lowest possible cost is of the utmost importance. Inventories are generally a relatively large balance sheet item and mismanagement of inventories, ranging from raw materials to finished goods, can cause a variety of serious problems. Among these are: disruptions of production, loss of customer goodwill, loss of contribution margin or lost sales. However, businesses that "never run out of anything" may be incurring needless high costs of carrying inventory that may prevent the realization of adequate profits. We can show the pros and cons of this in balanced form as follows:

Costs that may be incurred in carrying inventory

1. Management costs
2. Insurance
3. State and local taxes
4. Interest
5. Space
6. Obsolescence
7. Handling

Costs that may be incurred by not carrying enough inventory

1. Discounts not realized
2. Disruptions of production
3. Additional purchasing cost
4. Additional transportation cost
5. Customer relations
6. Additional high cost of rush orders
and/or production
7. Lost profit on sales not made

Costs Relevant to Inventory Control

It is apparent that many of these factors are not in the accounting records and must be determined by analysis. In some cases the cost may be insignificant or zero depending on the circumstances. Care must be used in determining whether a particular cost is relevant. For example, if the space is available (whether or not owned) and cannot be used for other profitable purposes, the cost of space is not relevant. However, if additional space must be obtained or inventory storage prevents the use of the space for other profitable activities, the cost is relevant. Interest cost of carrying inventory should be considered regardless of whether or not funds were borrowed to purchase inventory, since funds not used for such purpose could be profitably put to an alternate use. The rate of interest depends on the facts in each case, such as: the cost of borrowing, the average cost of capital (including debt and equity capital) or the rate that could be earned by an alternate use of the capital.

Economic Order Quantity (Standard Order)

The economic order quantity is the amount of inventory that should be purchased at any one time in order to minimize to total costs associated with inventory (carrying costs and ordering costs). The economic order quantity may be computed by trial and error or by formula as follows:

Symbols	Q = Economic order quantity
	S = Total units sold during the period
	O = Ordering cost per order
	C = Carrying cost per unit

Formula

$$Q = \sqrt{\frac{2SO}{C}}$$

Example: A manufacturer purchases bicycle frames at a cost of \$5 per unit. The total annual needs are 50,000 units at an average rate of 200 frames per workday. Maximum daily usage is 250 frames. Delivery of an order normally takes 4 days.

Other information:

Cost of borrowing (or return that could be earned by alternate use of funds) $8\% \times \$5.00$	\$.40
Rent per unit per year	.18
Taxes per unit per year	.06
Insurance	<u>.06</u>
Total carrying cost per year	\$.70
Cost per purchase order	\$14.00

Solution:

(a) Formula:

$$Q = \sqrt{\frac{2SO}{C}}$$

$$Q = \sqrt{\frac{2(50,000)(\$14)}{.70}}$$

$$Q = \sqrt{2,000,000}$$

$$Q = \underline{\underline{1,415}}$$

(b) Trial and Error:

Order size (Q)	1,000	1,500	2,000
Average Inventory (Q/2)	500	750	1,000
No. of orders (S/Q)	50	33 1/3	25
Annual storage cost ($C \times Q/2$)	\$ 350	\$525	\$ 700
Purchase order cost ($O \times S/Q$)	<u>\$ 700</u>	<u>\$467</u>	<u>\$ 350</u>
	<u>\$1,050</u>	<u>\$992</u>	<u>\$1,050</u>

We can see that 1,500 units per order results in the lowest cost. If we try 1,400 or 1,600 we would know in which direction the cost trend is moving as follows:

Order size	1,400	1,600	1,415
Average inventory	700	800	708
No. of orders	35 5/7	62 1/2	35 1/3
Annual storage cost	\$490	\$560.00	\$496.00
Purchase order cost	<u>\$500</u>	<u>\$437.50</u>	<u>\$493.50</u>
	<u>\$990</u>	<u>\$997.50</u>	<u>\$989.50</u>

Lead Time and Safety Stock

When we have determined the economic order quantity of the size of an order that minimizes annual cost, we must determine when to order. To do this we must know:

1. Lead time—interval between the placing of an order and delivery, in this case 4 days.
2. Economic order quantity—in this example, 1415.
3. Demand during Lead Time— $4 \times 200 = 800$.

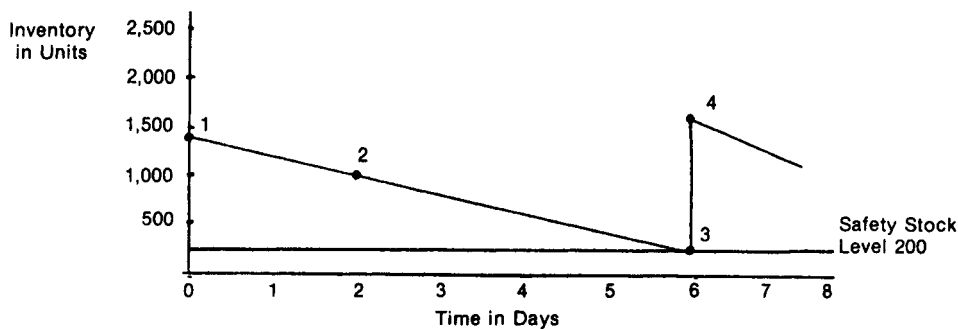
The order point is determined as the safety stock plus average usage during lead time. The safety stock must be sufficient to provide for maximum usage of stock during lead time. For example:

Maximum daily usage	250	
Average daily usage	<u>200</u>	
Excess	50	
Lead time	$\times \underline{4}$	
Safety Stock	200	
Average usage during lead time	<u>800</u>	
Order Point	<u>1,000</u>	units

Or we could simplify this by saying that the order point should be:

$$\text{Maximum usage} \times \text{lead time} \text{ or } 250 \times 4 = \underline{1,000} \text{ units}$$

Graphically, this can be shown as:



- (1) Start—1415 units
- (2) Order point—1,000 units
- (3) Order received
- (4) Inventory increases to 1,615

Note: If inventory level was zero, caused by maximum usage during lead time, the inventory level would go to only 1,415 when the order was received.

JUST-IN-TIME INVENTORY PHILOSOPHY:

Under JIT inventory methods raw materials are obtained "just-in-time" for use in production, finished goods are produced "just-in-time" for delivery, and other inventory items are provided just when needed. A JIT system minimizes or potentially eliminates inventory and its related carrying costs. Implementation of a JIT system requires a backlog of orders and reliable suppliers so that the production process is not interrupted. The benefits of JIT would be lost if a company had to shut down its operation for long periods while waiting for new orders or materials/supplies.

Advantages of a JIT system include:

- Release of funds invested in inventory.
- Frees space.
- Reduces production time (throughput time).
- Reduces/eliminates nonvalue-add activities such as movement of inventory, storage, setup time.
- Improves quality as defective inventory must be corrected immediately; there are no inventory pools to hold defective units.
- As goods are produced to order not for inventory, better control is required over lost or spoiled goods.
- Simplifies accounting by charging costs directly to cost of goods sold (no inventory). If inventory exists, the inventory is "backed out" of the cost of goods sold account. Backing inventory amounts out of cost of goods sold is referred to as **backflush** accounting.

Solution to Cash Budget Illustrative Problem

a. 1.

Modern Products Corporation
SCHEDULE COMPUTING FINISHED GOODS PRODUCTION BUDGET (UNITS)
FOR OCTOBER, NOVEMBER AND DECEMBER 19X7

	<u>October</u>	<u>November</u>	<u>December</u>
Budgeted sales—units	120,000	90,000	120,000
Inventory required at end of month	<u>18,000</u>	<u>24,000</u>	<u>24,000</u>
Total to be accounted for	138,000	114,000	144,000
Less inventory on hand at beginning of month	<u>24,000</u>	<u>18,000</u>	<u>24,000</u>
Budgeted production—units	<u>114,000</u>	<u>96,000</u>	<u>120,000</u>

a. 2.

SCHEDULE COMPUTING RAW MATERIALS INVENTORY
PURCHASE BUDGET (POUNDS)
FOR OCTOBER AND NOVEMBER 19X7

	<u>October</u>	<u>November</u>
Budgeted production—pounds (1/2 lb. per unit)	57,000	48,000
Inventory required at end of month	<u>19,200</u>	<u>24,000</u>
Total to be accounted for	76,200	72,000
Less inventory on hand at beginning of month	<u>22,800</u>	<u>40,800</u>
Balance required by purchase	<u>53,400</u>	<u>31,200</u>
Budgeted purchases—pounds (based on minimum shipments of 25,000 lbs. each)	<u>75,000</u>	<u>50,000</u>

b.

PROJECTED INCOME STATEMENT
FOR THE MONTH OF NOVEMBER

Sales (90,000 units at \$2)		\$180,000
Less: Cash discounts on sales	\$ 1,800	
Estimated bad debts (1/2% of gross sales)	<u>900</u>	<u>2,700</u>
Net sales		177,300
Cost of sales:		
Standard (90,000 units at \$1.20)	108,000	
Add under-absorbed overhead (standard production of 100,000 units less budgeted production of 96,000 units equals 4,000 units times \$.10)	<u>400</u>	<u>108,400</u>
Gross profit on sales		68,900
Expenses:		
Selling (10% of gross sales)	18,000	
Administrative (\$33,000 per month)	33,000	
Interest expense	<u>500</u>	<u>51,500</u>
Net income		<u>\$ 17,400</u>

c.

CASH FORECAST FOR THE MONTH OF NOVEMBER

Cash balance, beginning of month		\$ 10,000
Receipts:		
Bank loan	\$ 99,500	
Collections of receivables:		
November 10—98% of \$60,000 billed October 31	58,800	
November 15—\$60,000 billed October 15		
less ½% + \$120,000	59,400	
November 25—98% of \$45,000 billed November 15	44,100	
November 30—\$60,000 billed October 31		
less ½% + \$120,000	<u>59,400</u>	<u>321,200</u>
Total		\$331,200
Disbursements:		
Accounts payable to suppliers for materials purchased in October	\$ 75,000	
November labor (96,000 units × .40)	38,400	
October manufacturing overhead—variable (114,000 units × .20)	22,800	
October manufacturing overhead—fixed portion (\$10,000 – \$4,000 depreciation)	6,000	
October selling expenses (10% × \$240,000)	24,000	
October administrative expenses (\$33,000 – \$500 depreciation)	<u>32,500</u>	
Total disbursements		<u>198,700</u>
Cash balance, end of month		<u>\$132,500</u>

APPENDIX A

Table 1 — Compound Value of \$1

N	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	12%	14%
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.120	1.140
2	1.020	1.040	1.081	1.082	1.103	1.124	1.145	1.186	1.188	1.210	1.254	1.300
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.405	1.482
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.380	1.412	1.464	1.574	1.689
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.762	1.925
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.974	2.195
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.211	2.502
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.476	2.853
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.773	3.252
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	3.106	3.707
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.479	4.226
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138	3.896	4.818
13	1.138	1.294	1.489	1.685	1.886	2.133	2.410	2.720	3.066	3.452	4.363	5.492
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797	4.887	6.261
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	5.474	7.138

Table 2 — Present Value of \$1

N	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	15%	16%	17%	18%	19%	20%
1	.99010	.98039	.97087	.96154	.95238	.94340	.93458	.92593	.91743	.90909	.86957	.86207	.85470	.84746	.84034	.83333
2	.98030	.96117	.94260	.92456	.90703	.89000	.87344	.85734	.84168	.82645	.75614	.74316	.73051	.71818	.70616	.69444
3	.97059	.94232	.91514	.88900	.86384	.83962	.81630	.79383	.77218	.75131	.65752	.64066	.62437	.60863	.59342	.57870
4	.96098	.92385	.88849	.85480	.82270	.79209	.76290	.73503	.70843	.68301	.57175	.55229	.53365	.51579	.49867	.48225
5	.95147	.90573	.86261	.82193	.78353	.74726	.71299	.68058	.64993	.62092	.49718	.47611	.45611	.43711	.41905	.40188
6	.94205	.88797	.83748	.79031	.74622	.70496	.66634	.63017	.59627	.56447	.43233	.41044	.39894	.37043	.35214	.33490
7	.93272	.87056	.81309	.75992	.71068	.66506	.62275	.58349	.54703	.51316	.37594	.35383	.33320	.31393	.29592	.27908
8	.92348	.85349	.78941	.73089	.67684	.62741	.58201	.54027	.50187	.46651	.32890	.30503	.28478	.26504	.24687	.22957
9	.91434	.83676	.76642	.70259	.64461	.59190	.54393	.50025	.46043	.42410	.28426	.26295	.24340	.22546	.20897	.19381
10	.90529	.82035	.74409	.67556	.61391	.55839	.50835	.46319	.42241	.38554	.24718	.22668	.20804	.19106	.17560	.16151
11	.89632	.80426	.72242	.64958	.58468	.52679	.47509	.42888	.38753	.35049	.21494	.19542	.17781	.16192	.14757	.13459
12	.88745	.78849	.70138	.62460	.55684	.49697	.44401	.39711	.35553	.31863	.18691	.16846	.15197	.13722	.12400	.11216
13	.87868	.77303	.68095	.60057	.53032	.46884	.41496	.36770	.32618	.28966	.16253	.14523	.12989	.11629	.10421	.09346
14	.86996	.75788	.66112	.57748	.50507	.44230	.38762	.34046	.29825	.26333	.14133	.12520	.11102	.09855	.08757	.07769
15	.86135	.74301	.64186	.55526	.48102	.41727	.36245	.31524	.27454	.23939	.12289	.10783	.09489	.08352	.07359	.06491

Table 3 — Compound Value of an Annuity of \$1

N	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	12%	14%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.120	2.140
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310	3.374	3.440
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.779	4.921
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.353	6.610
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	8.115	8.536
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	10.089	10.730
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436	12.300	13.233
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.776	16.085
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937	17.549	19.337
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	20.655	23.045
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384	24.133	27.271
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	28.029	32.089
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019	27.975	32.393	37.581
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361	31.772	37.280	43.842

Table 4 — Present Value of an Annuity of \$1

N	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	15%	16%	17%	18%	19%	20%
1	.9901	.9804	.9709	.9615	.9524	.9434	.9346	.9259	.9174	.9091	.8696	.8621	.8547	.8475	.8403	.8333
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	1.6257	1.6052	1.5852	1.5656	1.5465	1.5278
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.2832	2.2459	2.2096	2.1743	2.1399	2.1065
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	2.8550	2.7982	2.7432	2.6901	2.6386	2.5887
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	3.3522	3.2743	3.1993	3.1272	3.0576	2.9906
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859	4.3553	3.7845	3.6847	3.5892	3.4976	3.4098	3.3255
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684	4.1004	4.0386	3.9224	3.8115	3.7057	3.6046
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713	5.7468	5.5348	5.3349	4.4873	4.3436	4.2072	4.0778	3.9544	3.8372
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590	4.7716	4.6065	4.4506	4.3030	4.1633	4.0310
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446	5.0188	4.8332	4.6586	4.4941	4.3389	4.1925
11	10.3676	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052	6.4951	5.2337	5.0286	4.8364	4.6560	4.4865	4.3271
12	11.2551	10.5753	9.9540	9.3851	8.8833	8.3838	7.9427	7.5361	7.1607	6.8137	5.4208	5.1971	4.9884	4.7932	4.6105	4.4392
13	12.1337	11.3484	10.6350	9.9856	9.3938	8.8527	8.3577	7.9038	7.4889	7.1034	5.5831	5.3423	5.1183	4.9095	4.7147	4.5327
14	13.0037	12.1062	11.2961	10.5631	9.8986	9.2950	8.7455	8.2442	7.7862	7.3667	5.7245	5.4675	5.2293	5.0081	4.8023	4.6106
15	13.8651	12.8493	11.9379	11.1184	10.3797	9.7122	9.1079	8.5595	8.0607	7.6061	5.8474	5.5755	5.3242	5.0916	4.8759	4.6755

Chapter Fourteen

Managerial Planning and Control Questions

COMPOUND INTEREST

1. Which of the following tables should be used to calculate the amount of the equal periodic payments which would be equivalent to an outlay of \$3,000 at the time of the last payment?

- Amount of 1.
- Amount of an annuity of 1.
- Present value of an annuity of 1.
- Present value of 1.

2. Which of the following tables would show the largest value for an interest rate of 5% for six periods?

- Amount of 1 at Compound Interest.
- Present Value of 1 at Compound Interest.
- Amount of Annuity of 1 per Period.
- Present Value of Annuity of 1 per Period.

Items 3 through 6 apply to the appropriate use of present-value tables. Given below are the present-value factors for \$1.00 discounted at 8% for one to five periods. Each of the following items is based on 8% interest compounded annually from day of deposit to day of withdrawal.

<i>Periods</i>	<i>Present value of \$1 discounted at 8% per period</i>
1	0.926
2	0.857
3	0.794
4	0.735
5	0.681

3. What amount should be deposited in a bank today to grow to \$1,000 three years from today?

- $\frac{\$1,000}{0.794}$
- $\$1,000 \times 0.926 \times 3$.
- $(\$1,000 \times 0.926) + (\$1,000 \times 0.857) + (\$1,000 \times 0.794)$.
- $\$1,000 \times 0.794$.

4. What amount should an individual have in his bank account today before withdrawal if he needs \$2,000 each year for four years with the first withdrawal to be made today and each subsequent withdrawal at one-year intervals? (He is to have exactly a zero balance in his bank account after the fourth withdrawal.)

- $\$2,000 + (\$2,000 \times 0.926) + (\$2,000 \times 0.857) + (\$2,000 \times 0.794)$.
- $\frac{\$2,000}{0.735} \times 4$.
- $(\$2,000 \times 0.926) + (\$2,000 \times 0.857) + (\$2,000 \times 0.794) + (\$2,000 \times 0.735)$.
- $\frac{\$2,000}{0.926} \times 4$.

5. If an individual put \$3,000 in a savings account today, what amount of cash would be available two years from today?

- $\$3,000 \times 0.857$.
- $\$3,000 \times 0.857 \times 2$.
- $\frac{\$3,000}{0.857}$
- $\frac{\$3,000}{0.926} \times 2$

6. What is the present value today of \$4,000 to be received six years from today?

- $\$4,000 \times 0.926 \times 6$.
- $\$4,000 \times 0.794 \times 2$.
- $\$4,000 \times 0.681 \times 0.926$.
- Cannot be determined from the information given.

7. Jarvis wants to invest equal semi-annual payments in order to have \$10,000 at the end of 20 years. Assuming that Jarvis will earn interest at an annual rate of 6% compounded semiannually, how would the periodic payment be calculated?

- \$10,000 divided by the future amount of an ordinary annuity of 40 payments of \$1 each at an interest rate of 3% per period.
- \$10,000 divided by the present value of an ordinary annuity of 40 payments of \$1 each at an interest rate of 3% per period.
- The future amount of an ordinary annuity of 20 payments of \$1 each at an interest rate of 6% per period divided into \$10,000.
- The present value of an ordinary annuity of 40 payments of \$1 each at an interest rate of 3% per period divided by \$10,000.

8. For the next 2 years, a lease is estimated to have an operating net cash inflow of \$7,500 per annum, before adjusting for \$5,000 per annum tax basis lease amortization, and a 40% tax rate. The present value of an ordinary annuity of \$1 per year at 10% for 2 years is \$1.74. What is the lease's after-tax present value using a 10% discount factor?

- \$2,610
- \$4,350
- \$9,570
- \$11,310

9. On January 1, 1987, Beal Corporation adopted a plan to accumulate funds for a new plant building to be erected beginning July 1, 1992, at an estimated cost of \$1,200,000. Beal intends to make five equal annual deposits in a fund that will earn interest at 8% compounded annually. The first deposit is made on July 1, 1987. Present value and future amount factors are as follows:

Present value of 1 at 8% for 5 periods	0.68
Present value of 1 at 8% for 6 periods	0.63
Future amount of ordinary annuity of 1 at 8% for 5 periods	5.87
Future amount of annuity in advance of 1 at 8% for 5 periods	6.34

Beal should make five annual deposits (rounded) of

- \$151,200
- \$163,200
- \$189,300
- \$204,400

10. Cooper plans to invest \$2,000 at the end of each of the next ten years. Assume that Cooper will earn interest at an annual rate of 6% compounded annually. The future amount of an ordinary annuity of \$1 for ten periods at 6% is 13.181. The present value of \$1 for ten periods at 6% is 0.558. The present value of an ordinary annuity of \$1 for ten periods at 6% is 7.360. The investment after the end of ten years would be

- \$14,720.
- \$21,200.
- \$26,362.
- \$27,478.

11. Cause Company is planning to invest in a machine with a useful life of five years and no salvage value. The machine is expected to produce cash flow from operations, net of income taxes, of \$20,000 in each of the five years. Cause's expected rate of return is 10%. Information on present value and future amount factors is as follows:

	<i>Period</i>				
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
Present value of \$1 at 10%	.909	.826	.751	.683	.621
Present value of annuity of \$1 at 10%	.909	1.736	2.487	3.170	3.791
Future amount of \$1 at 10%	1.100	1.210	1.331	1.464	1.611
Future amount of annuity of \$1 at 10%	1.000	2.100	3.310	4.641	6.105

How much will the machine cost?

- \$32,220.
- \$62,100.
- \$75,820.
- \$122,100.

12. On May 1, 19X9, a company sold some machinery to another company. The two companies entered into an installment sales contract at a predetermined interest rate. The contract required five equal annual payments with the first payment due on May 1, 19X9. What present value concept is appropriate for this situation?

- Present value of an annuity due of \$1 for five periods.
- Present value of an ordinary annuity of \$1 for five periods.
- Future amount of an annuity of \$1 for five periods.
- Future amount of \$1 for five periods.

13. On January 1, 19X0, Liberty Company sold a machine to Bell Corporation in an "arms length" transaction. Bell signed a noninterest bearing note requiring payment of \$20,000 annually for ten years. The first payment was made on January 1, 19X0. The prevailing rate of interest for this type of note at date of issuance was 12%. Information on present value factors is as follows:

<i>Period</i>	<i>Present value of \$1 at 12%</i>	<i>Present value of ordinary annuity of \$1 at 12%</i>
9	0.361	5.328
10	0.322	5.650

Liberty should record the above sale in January 19X0 at

- a. \$64,400.
- b. \$84,980.
- c. \$113,000.
- d. \$126,560.

14. Scott, Inc., is planning to invest \$120,000 in a ten-year project. Scott estimates that the annual cash inflow, net of income taxes, from this project will be \$20,000. Scott's desired rate of return on investments of this type is 10%. Information on present value factors is as follows:

	<u>At 10%</u>	<u>At 12%</u>
Present value of \$1 for ten periods	0.386	0.322
Present value of an annuity of \$1 for ten periods	6.145	5.650

Scott's expected rate of return on this investment is

- a. Less than 10%, but more than 0%.
- b. 10%.
- c. Less than 12%, but more than 10%.
- d. 12%.

15. On March 15, 1990, Ashe Corp. adopted a plan to accumulate \$1,000,000 by September 1, 1994. Ashe plans to make four equal annual deposits to a fund that will earn interest at 10% compounded annually. Ashe made the first deposit on September 1, 1990. Future value and future amount factors are as follows:

Future value of 1 at 10% for 4 periods	1.46
Future amount of ordinary annuity of 1 at 10% for 4 periods	4.64
Future amount of annuity in advance of 1 at 10% for 4 periods	5.11

Ashe should make four annual deposits (rounded) of

- a. \$250,000
- b. \$215,500
- c. \$195,700
- d. \$146,000

CAPITAL BUDGETING

Items 16 through 19 are based on the following information:

The Apex Company is evaluating a capital-budgeting proposal for the current year. The relevant data follow:

<u>Year</u>	<u>Present Value of an Annuity in Arrears of \$1 at 15%</u>
1	\$.870
2	1.626
3	2.284
4	2.856
5	3.353
6	3.785

The initial investment would be \$30,000. It would be depreciated on a straight-line basis over six years with no salvage. The before-tax annual cash inflow due to this investment is \$10,000, and the income tax rate is 40% paid the same year as incurred. The desired rate of return is 15%. All cash flows occur at year end.

16. What is the after-tax accounting rate of return on Apex's capital-budgeting proposal?

- a. 10%.
- b. 16-2/3%.
- c. 26-2/3%.
- d. 33-1/3%.

17. What is the after-tax payback reciprocal for Apex's capital-budgeting proposal?

- a. 20%.
- b. 26-2/3%.
- c. 33-1/3%.
- d. 50%.

18. What is the net present value of Apex's capital-budgeting proposal?

- a. \$(7,290).
- b. \$280.
- c. \$7,850.
- d. \$11,760.

19. How much would Apex have had to invest five years ago at 15% compounded annually to have \$30,000 now?

- a. \$12,960.
- b. \$14,910.
- c. \$17,160.
- d. Cannot be determined from the information given.

20. The following selected data pertain to the Darwin Division of Beagle Co. for 1994:

Sales	\$400,000
Operating income	40,000
Capital turnover	4
Imputed interest rate	10%

What was Darwin's 1994 residual income?

- a. \$0
- b. \$4,000
- c. \$10,000
- d. \$30,000

21. Polo Co. requires higher rates of return for projects with a life span greater than five years. Projects extending beyond five years must earn a higher specified rate of return. Which of the following capital budgeting techniques can readily accommodate this requirement?

	<i>Internal rate of return</i>	<i>Net present value</i>
a.	Yes	No
b.	No	Yes
c.	No	No
d.	Yes	Yes

22. Residual income is income

- a. To which an imputed interest charge for invested capital is added.
- b. From which an imputed interest charge for invested capital is deducted.
- c. From which dividends are deducted.
- d. To which dividends are added.

Items 23 through 26 are based on the following:

Tam Co. is negotiating for the purchase of equipment that would cost \$100,000, with the expectation that \$20,000 per year could be saved in after-tax cash costs if the equipment were acquired. The equipment's estimated useful life is 10 years, with no residual value, and would be depreciated by the straight-line method. Tam's predetermined minimum desired rate of return is 12%. Present value of an annuity of 1 at 12% for 10 periods is 5.65. Present value of 1 due in 10 periods at 12% is .322.

23. Net present value is

- a. \$5,760
- b. \$6,440
- c. \$12,200
- d. \$13,000

24. Payback period is

- a. 4.0 years.
- b. 4.4 years.
- c. 4.5 years.
- d. 5.0 years.

25. Accrual accounting rate of return based on initial investment is

- a. 30%
- b. 20%
- c. 12%
- d. 10%

26. In estimating the internal rate of return, the factors in the table of present values of an annuity should be taken from the columns closest to

- a. 0.65
- b. 1.30
- c. 5.00
- d. 5.65

Items 27 and 28 are based on the following information:

The Gravina Company is planning to spend \$6,000 for a machine which it will depreciate on a straight-line basis over a ten-year period. The machine will generate additional cash revenues of \$1,200 a year. Gravina will incur no additional costs except for depreciation. The income tax rate is 50%.

27. What is the payback period?

- a. 3.3 years.
- b. 4.0 years.
- c. 5.0 years.
- d. 6.7 years.

28. What is the accounting (book-value) rate of return on the initial increase in required investment?

- a. 5%.
- b. 10%.
- c. 15%.
- d. 20%.

29. How are the following used in the calculation of the internal rate of return of a proposed project? Ignore income tax considerations.

	<i>Residual sales value of project</i>	<i>Depreciation expense</i>
a.	Exclude	Include
b.	Include	Include
c.	Exclude	Exclude
d.	Include	Exclude

Items 30 and 31 are based on the following information:

Flemming, Inc., is planning to acquire a new machine at a total cost of \$36,000. The estimated life of the machine is six years with no salvage value. The straight-line method of depreciation will be used. Flemming estimates that the annual cash flow from operations, before income taxes, from using this machine will be \$9,000. Assume that Flemming's cost of capital is 8% and the income tax rate is 40%. The present value of \$1 at 8% for six years is .630. The present value of an annuity of \$1 in arrears at 8% for six years is 4.623.

30. What would the payback period be?

- a. 4.0 years.
- b. 4.6 years.
- c. 5.7 years.
- d. 6.7 years.

31. What would the net present value be?

- a. \$59.
- b. \$5,607.
- c. \$10,800.
- d. \$13,140.

32. Sant Company is planning to invest \$40,000 in a machine with a useful life of five years and no salvage value. The straight-line method of depreciation will be used. Sant estimates that the annual cash inflow from operations, net of income taxes, from using this machine will be \$10,000. Sant's desired rate of return on investments of this type is 10%. The present value of an ordinary annuity of \$1 for five periods at 10% is 3.791. The present value of \$1 for five periods at 10% is 0.621. Using the net present-value method, Sant's true rate of return on this investment is

- a. 0%.
- b. Less than 10%, but more than 0%.
- c. 10%.
- d. More than 10%.

33. Which of the following capital budgeting techniques implicitly assumes that the cash flows are reinvested at the company's minimum required rate of return?

	<u>Net present value</u>	<u>Internal rate of return</u>
a.	Yes	Yes
b.	Yes	No
c.	No	Yes
d.	No	No

34. Pole Co. is investing in a machine with a 3 year life. The machine is expected to reduce annual cash operating costs by \$30,000 in each of the first 2 years and by \$20,000 in year 3. Present values of an annuity of \$1 at 14% are:

Period 1	0.88
2	1.65
3	2.32

Using a 14% cost of capital, what is the present value of these future savings?

- a. \$59,600
- b. \$60,800
- c. \$62,900
- d. \$69,500

35. The Polar Company is planning to purchase a new machine for \$30,000. The payback period is expected to be five years. The new machine is expected to produce cash flow from operations, net of income taxes, of \$7,000 a year in each of the next three years and \$5,500 in the fourth year. Depreciation of \$5,000 a year will be charged to income for each of the five years of the payback period. What is the amount of cash flow from operations, net of taxes, that the new machine is expected to produce in the last (fifth) year of the payback period?

- a. \$1,000.
- b. \$3,500.
- c. \$5,000.
- d. \$8,500.

36. Following is information relating to Kew Co.'s Value Division for 1991:

Sales	\$500,000
Variable costs	300,000
Traceable fixed costs	50,000
Average invested capital	100,000
Imputed interest rate	6%

Vale's residual income was

- a. \$144,000
- b. \$150,000
- c. \$156,000
- d. \$200,000

37. Roberts, Inc., purchased a machine for \$240,000. The machine has a useful life of six years and no salvage value. Straight-line depreciation is to be used. The machine is expected to generate cash flow from operations, net of income taxes, of \$70,000 in each of the six years. Roberts' expected rate of return is 12%. Information on present value factors is as follows:

<i>Period</i>	<i>Present value of \$1 at 12%</i>	<i>Present value of ordinary annuity of \$1 at 12%</i>
1	.893	.893
2	.797	1.690
3	.712	2.402
4	.636	3.037
5	.567	3.605
6	.507	4.111

What would be the net present value?

- \$35,490.
- \$47,770.
- \$121,680.
- \$123,330.

38. Under the internal rate of return capital budgeting technique, it is assumed that cash flows are reinvested at the

- Cost of capital.
- Hurdle rate of return.
- Rate earned by the investment.
- Payback rate.

39. Lin Co. is buying machinery it expects will increase average annual operating income by \$40,000. The initial increase in the required investment is \$60,000, and the average increase in required investment is \$30,000. To compute the accrual accounting rate of return, what amount should be used as the numerator in the ratio?

- \$20,000
- \$30,000
- \$40,000
- \$60,000

40. Doro Co. is considering the purchase of a \$100,000 machine that is expected to result in a decrease of \$25,000 per year in cash expenses after taxes. This machine, which has no residual value, has an estimated useful life of 10 years and will be depreciated on a straight-line basis. For this machine, the accounting rate of return based on initial investment would be

- 10%
- 15%
- 25%
- 35%

41. The discount rate (hurdle rate of return) must be determined in advance for the

- Payback period method.
- Time adjusted rate of return method.
- Net present value method.
- Internal rate of return method.

Items 42 and 43 are based on the following information pertaining to Yola Co.'s East Division for 1988:

Sales	\$620,000
Variable costs	500,000
Traceable fixed costs	100,000
Average invested capital	50,000
Imputed interest rate	18%

42. The return on investment was

- 40.00%
- 29.00%
- 18.00%
- 8.33%

43. The residual income was

- \$3,600
- \$9,000
- \$11,000
- \$20,000

44. Major Corp. is considering the purchase of a new machine for \$5,000 that will have an estimated useful life of five years and no salvage value. The machine will increase Major's after-tax cash flow by \$2,000 annually for five years. Major uses the straight-line method of depreciation and has an incremental borrowing rate of 10%. The present value factors for 10% are as follows:

Ordinary annuity with five payments	3.79
Annuity due for five payments	4.17

Using the payback method, how many years will it take to pay back Major's initial investment in the machine?

- 2.50
- 5.00
- 7.58
- 8.34

45. Division A is considering a project that will earn a rate of return which is greater than the imputed interest charge for invested capital, but less than the division's historical return on invested capital. Division B is considering a project that will earn a rate of return which is greater than the division's historical return on invested capital, but less than the imputed interest charge for invested capital. If the objective is to maximize residual income, should these divisions accept or reject their projects?

- | | <u>A</u> | <u>B</u> |
|----|----------|----------|
| a. | Accept | Accept |
| b. | Reject | Accept |
| c. | Reject | Reject |
| d. | Accept | Reject |

BUDGETING

46. Neu Co. is considering the purchase of an investment that has a positive net present value based on Neu's 12% hurdle rate. The internal rate of return would be

- 0.
- 12%.
- >12%.
- <12%.

Items 47, 48, 49 are based on the following information:

The January 31, 19XX, balance sheet of Shelpat Corporation follows:

Cash	\$8,000
Accounts receivable (net of allowance for uncollectible accounts of \$2,000)	38,000
Inventory	16,000
Property, plant and equipment (net of allowance for accumulated depreciation of \$60,000)	<u>40,000</u>
	<u>\$102,000</u>
Accounts payable	\$ 82,500
Common stock	50,000
Retained earnings (deficit)	<u>(30,500)</u>
	<u>\$102,000</u>

Sales are budgeted as follows:

February \$110,000

March \$120,000

Collections are expected to be 60% in the month of sale, 38% the next month, and 2% uncollectible.

The gross margin is 25% of sales. Purchases each month are 75% of the next month's projected sales. The purchases are paid in full the following month.

Other expenses for each month, paid in cash, are expected to be \$16,500. Depreciation each month is \$5,000.

47. What are the budgeted cash collections for February 19XX?

- \$63,800.
- \$66,000.
- \$101,800.
- \$104,000.

48. What is the pro forma income (loss) before income taxes for February 19XX?

- (\$3,700).
- (\$1,500).
- \$3,800.
- \$6,000.

49. What is the projected balance in accounts payable on February 29, 19XX?

- \$82,500.
- \$86,250.
- \$90,000.
- \$106,500.

50. A 1995 cash budget is being prepared for the purchase of Toyi, a merchandise item. Budgeted data are:

Cost of goods sold for 1995	\$300,000
Accounts payable 1/1/95	20,000
Inventory - 1/1/95	30,000
12/31/95	42,000

Purchases will be made in 12 equal monthly amounts and paid for in the following month. What is the 1995 budgeted cash payment for purchases of Toyi?

- \$295,000
- \$300,000
- \$306,000
- \$312,000

51. Varsity Co. is preparing its cash budget for the month of May. The following information on accounts receivable collections is available from Varsity's past collection experience:

Current month's sales	12%
Prior month's sales	75%
Sales 2 months prior to current mo.	6%
Sales 3 months prior to current mo.	4%
Cash discounts taken	2%
Doubtful accounts	1%

Credit sales are as follows:

May—estimated	\$100,000
April	90,000
March	80,000
February	95,000

What are the estimated accounts receivable collections for May?

- \$85,100.
- \$87,100.
- \$88,100.
- \$90,100.

52. Lon Co.'s budget committee is preparing its master budget on the basis of the following projections:

Sales	\$2,800,000
Decrease in inventories	70,000
Decrease in accounts payable	150,000
Gross margin	40%

What are Lon's estimated cash disbursements for inventories?

- \$1,040,000
- \$1,200,000
- \$1,600,000
- \$1,760,000

53. The purpose of a flexible budget is to

- Allow management some latitude in meeting goals.
- Eliminate cyclical fluctuations in production reports by ignoring variable costs.
- Compare actual and budgeted results at virtually any level of production.
- Reduce the total time in preparing the annual budget.

54. Serven Corporation has estimated its activity for June 19X9. Selected data from these estimated amounts are as follows:

Sales	\$700,000
Gross profit (based on sales)	30%
Increase in trade accounts receivable during month	\$ 20,000
Change in accounts payable during month	\$ 0
Increase in inventory during month	\$ 10,000
Variable selling, general and administrative expenses (S, G & A) includes a charge for uncollectible accounts of 1% of sales.	
Total S, G & A is \$71,000 per month plus 15% of sales.	
Depreciation expense of \$40,000 per month is included in fixed S, G & A.	

On the basis of the above data, what are the estimated cash disbursements from operations for June?

- \$619,000.
- \$626,000.
- \$629,000.
- \$636,000.

55. The basic difference between a master budget and a flexible budget is that a master budget is

- Only used before and during the budget period and a flexible budget is only used after the budget period.
- For an entire production facility and a flexible budget is applicable to single departments only.
- Based on one specific level of production and a flexible budget can be prepared for any production level within a relevant range.
- Based on a fixed standard and a flexible budget allows management latitude in meeting goals.

56. The Fresh Company is preparing its cash budget for the month of May. The following information is available concerning its accounts receivable:

Estimated credit sales for May	\$200,000
Actual credit sales for April	\$150,000
Estimated collections in May for credit sales in May	20%
Estimated collections in May for credit sales in April	70%
Estimated collections in May for credit sales prior to April	\$ 12,000
Estimated write-offs in May for uncollectible credit sales	\$8,000
Estimated provision for bad debts in May for credit sales in May	\$7,000

What are the estimated cash receipts from accounts receivable collections in May?

- a. \$142,000.
- b. \$149,000.
- c. \$150,000.
- d. \$157,000.

57. Glo Co., a manufacturer of combs, budgeted sales of 125,000 units for the month of April 1987. The following additional information is provided:

	<i>Number of units</i>
Actual inventory at April 1	
Work-in-process	None
Finished goods	37,500
Budgeted inventory at April 30	
Work-in-process (75% processed)	8,000
Finished goods	30,000

How many equivalent units of production did Glo budget for April 1987?

- a. 126,500
- b. 125,500
- c. 123,500
- d. 117,500

58. Mien Co. is budgeting sales of 53,000 units of product for Nous for October 1995. The manufacture of one unit of Nous requires 4 kilos of chemical Loire. During October 1995, Mien plans to reduce the inventory of Loire by 50,000 kilos and increase the finished goods inventory of Nous by 6,000 units. There is no Nous work-in-process inventory. How many kilos of Loire is Mien budgeting to purchase in October 1995?

- a. 138,000
- b. 162,000
- c. 186,000
- d. 238,000

59. In preparing its cash budget for May 1989, Ben Co. made the following projections:

Sales	\$3,000,000
Gross margin (based on sales)	25%
Decrease in inventories	\$ 140,000
Decrease in accounts payable for inventories	\$ 240,000

For May 1989 the estimated cash disbursements for inventories were

- a. \$2,350,000
- b. \$2,110,000
- c. \$2,100,000
- d. \$1,870,000

60. Lawton Company produces canned tomato soup and is budgeting sales of 250,000 units for the month of January 1983. Actual inventory units at January 1 and budgeted inventory units at January 31 are as follows:

	<i>Units</i>
Actual inventory at January 1:	
Work-in-process	None
Finished goods	75,000
Budgeted inventory at January 31:	
Work-in-process (75% processed)	16,000
Finished goods	60,000

How many equivalent units of production is Lawton budgeting for January 1983?

- a. 235,000
- b. 247,000
- c. 251,000
- d. 253,000

INVENTORY

61. The economic order quantity formula assumes that

- a. Periodic demand for the good is known.
- b. Carrying costs per unit vary with quantity ordered.
- c. Costs of placing an order vary with quantity ordered.
- d. Purchase costs per unit differ due to quantity discounts.

62. For inventory management, ignoring safety stocks, which of the following is a valid computation of the reorder point?

- a. The economic order quantity.
- b. The economic order quantity multiplied by the anticipated demand during the lead time.
- c. The anticipated demand during the lead time.
- d. The square root of the anticipated demand during the lead time.

63. The economic order quantity formula assumes that
- Purchase costs per unit differ due to quantity discounts.
 - Costs of placing an order vary with quantity ordered.
 - Periodic demand for the good is known.
 - Erratic usage rates are cushioned by safety stocks.

Items 64 and 65 are based on the following information:

Expected annual usage of a particular raw material is 2,000,000 units, and the standard order size is 10,000 units. The invoice cost of each unit is \$500, and the cost to place one purchase order is \$80.

64. The average inventory is
- 1,000,000 units.
 - 5,000 units.
 - 10,000 units.
 - 7,500 units.

65. The estimated annual order cost is
- \$16,000.
 - \$100,000.
 - \$32,000.
 - \$50,000.

66. What effect, if any, will a last-in, first-out or first-in, first-out inventory method have on an Economic Order Quantity?
- No effect.
 - LIFO will increase the order quantity in times of rising prices.
 - LIFO will reduce the order quantity in times of rising prices.
 - FIFO will increase the order quantity in times of rising prices.

Items 67 and 68 are based on the following information:

Brady Sporting Goods Incorporated buys baseballs at \$20 per dozen from its wholesaler. Brady will sell 36,000 dozen baseballs evenly throughout the year. Brady desires a 10% return on its inventory investment. In addition, rent, insurance, taxes, etc., for each dozen baseballs in inventory is \$0.40. The administrative cost involved in handling each purchase order is \$10.

67. What is the economic order quantity?
- Approximately 448.
 - Approximately 500.
 - Approximately 548.
 - Approximately 600.

68. Assuming that Brady ordered in order sizes of 800 dozen evenly throughout the year, what would be the total annual inventory expenses to sell 36,000 dozen baseballs?
- \$1,315.
 - \$1,320.
 - \$1,338.
 - \$1,410.

69. Which changes in costs are most conducive to switching from a traditional inventory ordering system to a just-in-time ordering system?

	<i>Cost per purchase order</i>	<i>Inventory unit carrying costs</i>
a.	Increasing	Increasing
b.	Decreasing	Increasing
c.	Decreasing	Decreasing
d.	Increasing	Decreasing

70. The Aron Company requires 40,000 units of Product Q for the year. The units will be required evenly throughout the year. It costs \$60 to place an order. It costs \$10 to carry a unit in inventory for the year. What is the economic order quantity?
- 400.
 - 490.
 - 600.
 - 693.

71. Politan Company manufactures bookcases. Set up costs are \$2.00. Politan manufactures 4,000 bookcases evenly throughout the year. Using the economic-order-quantity approach, the optimal production run would be 200 when the cost of carrying one bookcase in inventory for one year is
- \$0.05.
 - \$0.10.
 - \$0.20.
 - \$0.40.

72. The following information relates to Eagle Company's material A:

Annual usage in units	7,200
Working days per year	240
Normal lead time in working days	20
Maximum lead time in working days	45

Assuming that the units of material A will be required evenly throughout the year, the safety stock and order point would be

	<u>Safety Stock</u>	<u>Order Point</u>
a.	600	750
b.	600	1,350
c.	750	600
d.	750	1,350

73. The following information is available for Trencher Company's material B:

Annual usage in units	10,000
Working days per year	250
Safety stock in units	400
Normal lead time in working days	30

Assuming that the units of material B will be required evenly throughout the year, the order point would be

- a. 400
- b. 800
- c. 1,200
- d. 1,600

74. The economic order quantity formula can be used to determine the optimum size of a

	<u>Production run</u>	<u>Purchase order</u>
a.	Yes	No
b.	Yes	Yes
c.	No	Yes
d.	No	No

75. Key Co. changed from a traditional manufacturing operation with a job order costing system to a just-in-time operation with a back-flush costing system. What is(are) the expected effects(s) of these changes on Key's inspection costs and recording detail of costs tracked to jobs in process?

	<u>Inspection costs</u>	<u>Detail of costs tracked to jobs</u>
a.	Decrease	Decrease
b.	Decrease	Increase
c.	Increase	Decrease
d.	Increase	Increase

76. Under the balanced scorecard concept developed by Kaplan and Norton, employee satisfaction and retention are measures used under which of the following perspectives?

- a. Customer.
- b. Internal business.
- c. Learning and growth.
- d. Financial.

77. Which of the following steps in the strategic planning process should be completed first?

- a. Translate objectives into goals.
- b. Determine actions to achieve goals.
- c. Develop performance measures.
- d. Create a mission statement.

Chapter Fourteen

Managerial Planning and Control Problems

NUMBER 1

The Scarborough Corporation manufactures and sells two products, Thingone and Thingtwo. In July 19X7, Scarborough's budget department gathered the following data in order to project sales and budget requirements for 19X8.

19X8 Projected Sales:

<u>Product</u>	<u>Units</u>	<u>Price</u>
Thingone	60,000	\$ 70
Thingtwo	40,000	\$100

19X8 Inventories - in units:

<u>Product</u>	<u>Expected Jan. 1, 19X8</u>	<u>Desired Dec. 31, 19X8</u>
Thingone	20,000	25,000
Thingtwo	8,000	9,000

In order to produce one unit of Thingone and Thingtwo, the following raw materials are used:

<u>Raw Material</u>	<u>Unit</u>	<u>Amount used per unit</u>	
		<u>Thingone</u>	<u>Thingtwo</u>
A	lbs.	4	5
B	lbs.	2	3
C	each		1

Projected data for 19X8 with respect to raw materials is as follows:

<u>Raw Material</u>	<u>Anticipated Purchase Price</u>	<u>Expected Inventories January 1, 19X8</u>	<u>Desired Inventories December 31, 19X8</u>
A	\$8	32,000 lbs.	36,000 lbs.
B	\$5	29,000 lbs.	32,000 lbs.
C	\$3	6,000 each	7,000 each

Projected direct labor requirements for 19X8 and rates are as follows:

<u>Product</u>	<u>Hours per unit</u>	<u>Rate per hour</u>
Thingone	2	\$3
Thingtwo	3	\$4

Overhead is applied at the rate of \$2 per direct labor hour.

Required:

Based upon the above projections and budget requirements for 19X8 for Thingone and Thingtwo, prepare the following budgets for 19X8:

1. Sales budget (in dollars)
2. Production budget (in units)
3. Raw materials purchase budget (in quantities)
4. Raw materials purchase budget (in dollars)
5. Direct labor budget (in dollars)
6. Budgeted finished goods inventory at December 31, 19X8 (in dollars)

NUMBER 2

A company is presently using the payback method for evaluating capital budgeting projects and is considering using other more sophisticated capital budgeting techniques. The president has requested an explanation of the advantages and disadvantages of the payback method.

Required:

1. State the advantages and disadvantages of the payback method.
2. What other capital budgeting techniques could be used?

NUMBER 3

The following information was available from Montero Corporation's books:

<u>2000</u>	<u>Purchases</u>	<u>Sales</u>
Jan.	\$42,000	\$72,000
Feb.	48,000	66,000
Mar.	36,000	60,000
Apr.	54,000	78,000

Collections from customers are normally 70% in the month of sale, 20% in the month following the sale, and 9% in the second month following the sale. The balance is expected to be uncollectible. Montero takes full advantage of the 2% discount allowed on purchases paid for by the tenth of the following month. Purchases for May are budgeted at \$60,000, while sales for May are forecasted at \$66,000. Cash disbursements for expenses are expected to be \$14,400 for the month of May. Montero's cash balance at May 1 was \$22,000.

Required:

Prepare the following schedules:

1. Expected cash collections during May.
2. Expected cash disbursements during May.
3. Expected cash balance at May 31.

NUMBER 4

The net present value method and the internal rate of return method are both sophisticated capital budgeting techniques.

Required:

1. State the advantages that both the net present value method and the internal rate of return method have over the payback method.
2. State the limitations of the net present value method.
3. State the limitations of the internal rate of return method.
4. How does each method (net present value and internal rate of return) handle depreciation? Discuss the rationale for your answer. Ignore income tax considerations in your answer.

NUMBER 5

Spara Corp. is considering the various benefits that may result from the shortening of its product cycle by changing from the company's present manual system to a computer-aided design/computer-aided manufacturing (CAD/CAM) system. The proposed system can provide productive time equivalency close to the 20,000 hours currently available with the manual system. The incremental annual out-of-pocket costs of maintaining the manual system are \$20 per hour.

The incremental annual out-of-pocket costs of maintaining the CAD/CAM system are estimated to be \$200,000, with an initial investment of \$480,000 in the proposed system. The estimated useful life of this system is six years. For tax purposes, assume a level accelerated cost recovery with a full year allowable in each year. The tax rate is expected to remain constant at 30% over the life of the project. Spara requires a minimum after-tax return of 20% on projects of this type. Full capacity will be utilized.

Required:

- a. Compute the relevant annual after-tax cash flows related to the CAD/CAM project.
- b. Based on the computation in a. above, compute the following on an after-tax basis:
 1. Payback period for recovery of investment.
 2. Internal rate of return (use the appropriate table below).
 3. Net present value (use the appropriate table below).
 4. Excess present value index (profitability index).

TABLE 1

Compound Amount of \$1.00 (The Future Value of \$1.00)

$S = P(1 + r)^n$. In this table $P = \$1.00$.

PERIODS	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
1	1.040	1.060	1.080	1.100	1.120	1.140	1.160	1.180	1.200	1.220	1.240	1.260
2	1.082	1.124	1.166	1.210	1.254	1.300	1.346	1.392	1.440	1.488	1.538	1.588
3	1.125	1.191	1.260	1.331	1.405	1.482	1.561	1.643	1.728	1.816	1.907	2.000
4	1.170	1.262	1.360	1.464	1.574	1.689	1.811	1.939	2.074	2.215	2.364	2.520
5	1.217	1.338	1.469	1.611	1.762	1.925	2.100	2.288	2.488	2.703	2.932	3.176
6	1.265	1.419	1.587	1.772	1.974	2.195	2.436	2.700	2.986	3.297	3.635	4.002

TABLE 2

Present value of \$1.00

$P = \frac{S}{(1 + r)^n}$. In this table $S = \$1.00$.

PERIODS	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
1	0.962	0.943	0.926	0.909	0.893	0.877	0.862	0.847	0.833	0.820	0.806	0.794
2	0.925	0.890	0.857	0.826	0.797	0.769	0.743	0.718	0.694	0.672	0.650	0.630
3	0.889	0.840	0.794	0.751	0.712	0.675	0.641	0.609	0.579	0.551	0.524	0.500
4	0.855	0.792	0.735	0.683	0.636	0.592	0.552	0.516	0.482	0.451	0.423	0.397
5	0.822	0.747	0.681	0.621	0.567	0.519	0.476	0.437	0.402	0.370	0.341	0.315
6	0.790	0.705	0.630	0.564	0.507	0.456	0.410	0.370	0.335	0.303	0.275	0.250

NUMBER 5 (cont.)

TABLE 3

Compound Amount of Annuity of \$1.00 in Arrears* (Future Value of Annuity)

$$S_n = \frac{(1+r)^n - 1}{r}$$

PERIODS	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.040	2.060	2.080	2.100	2.120	2.140	2.160	2.180	2.200	2.220	2.240	2.260
3	3.122	3.184	3.246	3.310	3.374	3.440	3.506	3.572	3.640	3.708	3.778	3.848
4	4.246	4.375	4.506	4.641	4.779	4.921	5.066	5.215	5.368	5.524	5.684	5.848
5	5.416	5.637	5.867	6.105	6.353	6.610	6.877	7.154	7.442	7.740	8.048	8.368
6	6.633	6.975	7.336	7.716	8.115	8.536	8.977	9.442	9.930	10.442	10.980	11.544

TABLE 4

Present value of Annuity of \$1.00 in Arrears*

*Payments (or receipts) at the end of each period.

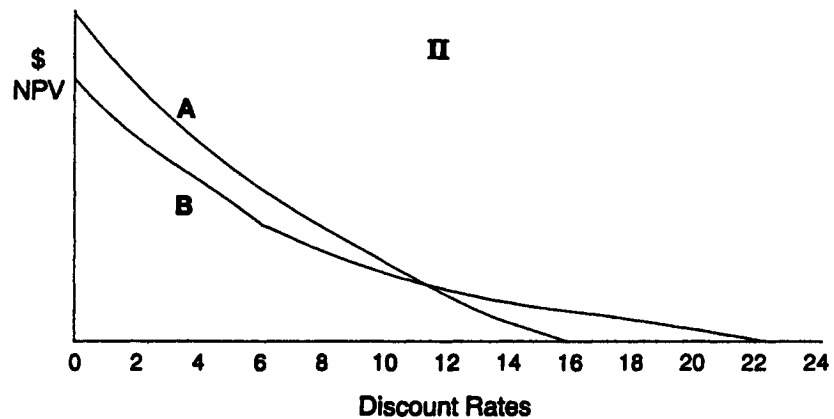
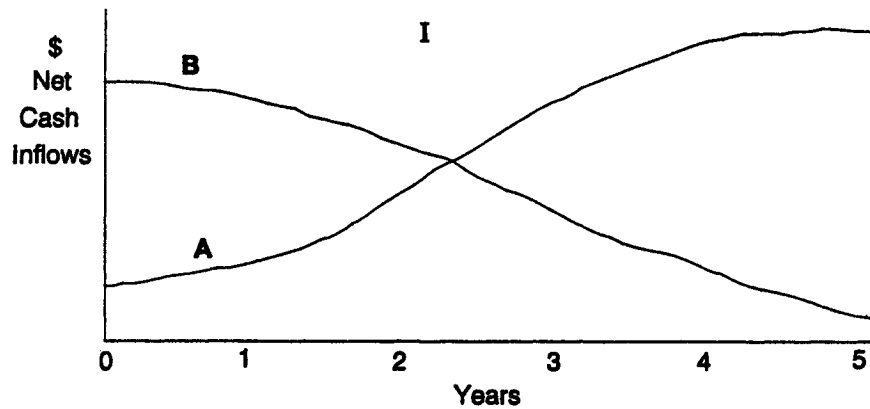
$$P_n = \frac{1}{r} \left[1 - \frac{1}{(1+r)^n} \right]$$

PERIODS	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
1	0.962	0.943	0.926	0.909	0.893	0.877	0.862	0.847	0.833	0.820	0.806	0.794
2	1.886	1.833	1.783	1.736	1.690	1.647	1.605	1.566	1.528	1.492	1.457	1.424
3	2.775	2.673	2.577	2.487	2.402	2.322	2.246	2.174	2.106	2.042	1.981	1.923
4	3.630	3.465	3.312	3.170	3.037	2.914	2.798	2.690	2.589	2.494	2.404	2.320
5	4.452	4.212	3.993	3.791	3.605	3.433	3.274	3.127	2.991	2.864	2.745	2.635
6	5.242	4.917	4.623	4.355	4.111	3.889	3.685	3.498	3.326	3.167	3.020	2.885

NUMBER 6

Items 1 through 4 are based on the following:

A company has two mutually exclusive projects, A and B, which have the same initial investment requirements and lives. Project B has a decrease in estimated net cash inflows each year, and project A has an increase in estimated net cash inflows each year. Project A has a greater total net cash inflow. Diagram I below depicts the net cash inflows of each project by year. Diagram II depicts the net present value (NPV) of each project assuming various discount rates.



Required:

For items 1 through 4, select your answer from the following list.

- A. Project A.
- B. Project B.
- C. Both projects equal.

1. Which project would be likely to have the shorter payback period?
2. Which project would have the greater average accounting rate of return?
3. Which project would have the greater internal rate of return?
4. Assume, due to innovation, the projects were to terminate at the end of year 4 with cash flows remaining as projected for the first 4 years and no cash flows in year 5. Which project would have the greater internal rate of return?

NUMBER 7

Lane College is developing schedules for its overall budget projection for the 1990-91 academic year. Relevant 1989-90 data include:

	<u>Undergraduates</u>	<u>Graduates</u>
Enrollment	4,200	1,300
Average number of credit hours carried each year per student	30	24
Average number of students per class	25	14
Average faculty teaching load in credit hours per year (number of classes taught multiplied by 3 credit hours per class)	(8 × 3) 24	(6 × 3) 18
Average faculty salary and benefits	\$50,000	\$60,000
Tuition per credit hour (no other fees required)	\$ 200	\$ 300

Changes projected for 1990-91 and additional information:

- Enrollments are expected to increase by 5 percent for both undergraduate and graduate programs.
- Average faculty salary and benefits are expected to increase by 3 percent.
- Lane has not previously used graduate students for teaching undergraduates, but will do so for 1990-91. All of the projected increased undergraduate enrollment will be taught by graduate students. Lane will recruit these graduate teaching assistants (TA's) in addition to the 5 percent student increase indicated. Each TA will carry half an average graduate student load and half an average faculty teaching load. TA's will receive a full remission of tuition fees and \$10,000 in salary and benefits. For budgeting purposes, the tuition remission is considered both a tuition revenue and a tuition scholarship.
- Non-faculty costs (excluding scholarships) for 1990-91 are to be budgeted by fixed and variable elements derived from estimates of cost at the following two levels of registration:

Total student credit hours (both schools)	140,000	180,000
Total estimated non-faculty costs	\$21,960,000	\$22,320,000

Required:

- Prepare the following 1990-91 budget schedules for each program:
 - Projected enrollment.
 - Projected student credit hours.
 - Projected number of full-time faculty and TA's.
 - Projected salaries and benefits for full-time faculty and TA's.
 - Projected tuition revenue.
- Calculate the fixed and variable elements in the non-faculty costs.
 - Calculate the budgeted non-faculty costs, including scholarships, for the 1990-91 academic year.

Chapter Fourteen

Solutions to Managerial Planning and Control Questions

1. (b) The equal periodic payments are an annuity and the \$3,000 is the future value of the annuity; therefore, the appropriate table of interest factors is the compound value (future value) of an annuity of \$1.

2. (c) Compound value factors are larger than present value factors as they include principal plus interest for a given period. Annuity factors are larger than single sum factors as they represent a series of payments for a period.

3. (d) $PV = FV \times PV \text{ Factor}$
 $PV = 1000 \times .794$

4. (a) The present value of an annuity is equal to the sum of the present values of the individual amounts. The first annuity payment was to be made at the beginning of the first year; therefore, its present value was equal to the amount of the payment (\$2,000).

5. (c) $PV = FV \times PV \text{ Factor}$
 $\$3,000 = FV \times .857$
 $FV = \$3,000 \div .857$

6. (c) An amount may be compounded or discounted at a given rate of interest to determine its equivalent at another point in time given that rate of interest. This new amount may again be compounded or discounted at the same rate of interest to yield yet another value at another point in time which is equivalent to the original amount given that interest rate used in compounding or discounting.

The \$4,000 is first discounted for 5 years to determine its equivalent at the end of the first year. This amount is then discounted for one year to determine its equivalent at the beginning of the first year. Note that any combination which totaled 6 years could have been used.

7. (a) 1) Payments are to be semi-annual for 20 years. Therefore, there will be 40 payments.
 2) Because the annual interest rate is 6%, the semi-annual rate equals 3%.
 3) Because we are dealing with compounding, we are interested in future values.

Answer (a) is the only choice which reflects 1-3 listed above. If (a) is reduced to a formula, it can be more readily seen that it results in the appropriate answer:

$$\text{Period payment needed} = \frac{\$10,000 \text{ at the end of 20 years}}{40 \text{ payments at 3\%}}$$

8. (d) \$11,310

Net cash inflow before tax	\$ 7500
- Lease amortization	(5000)
	\$ 2500
- Tax (2500 x 40%)	(1000)
	\$ 1500
+ Lease amortization	5000
Net cash inflow after taxes	\$ 6500
Present value factor	x 1.74
	<u>\$11,310</u>

9. (c) A 5-year annuity starting 7/1/87 will have its last payment on 7/1/91. Because the future value of \$1,200,000 is on 7/1/92, the annuity is an annuity due or annuity in advance (payment being made at the beginning of the period).

$$\begin{aligned} \text{F.V.} &= \text{Annuity} \times \text{F.V. factor} \\ \text{Annuity} &= \text{F.V.} / \text{F.V. factor} \\ \text{Annuity} &= \$1,200,000 / 6.34 = \underline{\underline{\$189,274}} \end{aligned}$$

Note that answer (d) is for an ordinary annuity using 5.87 as the F.V. factor.

10. (c) \$26,362

Use the future amount of an ordinary annuity of \$1 for ten periods at 6%, or 13.181.

$$\$2,000 \times 13.181 = \$26,362$$

11. (c) \$20,000 cash flow $\times 3.791$ PVF = \$75,820

Cost of machine would be its present value. Therefore, the P.V. annuity factor for 5N is the appropriate factor.

12. (a) The first payment is to be made at the beginning of the first year. Therefore, the appropriate factor is the present value of an annuity due for 5N.

13. (d) Payment 1/1/X0	\$20,000
Present value of 9 future payments	
\$20,000 $\times 5.328$	<u>106,560</u>
	<u>\$126,560</u>
or	
\$20,000 $(5.328 + 1.000)$	<u>\$126,560</u>

For present value of annuity due (beginning of year) the factor is the ordinary annuity factor for N-1 plus 1.0000 for the first payment.

14. (c) The true rate of return is that rate which equates the present value of the future returns with the cost of the investment.

$$\begin{aligned} \text{PV} &= \text{FV} \times \text{PVIF} \\ 120,000 &= 20,000 \times \text{PVIF} \\ \frac{120,000}{20,000} &= \text{PVIF} \\ 6.000 &= \text{PVIF} \end{aligned}$$

As the factor is between the factors for 10% and 12% the rate of return is less than 12% and more than 10%.

15. (c) \$195,700.

$$\begin{aligned} \text{Future Value} &= \text{Annuity} \times \text{Future Value Factor} \\ \$1,000,000 &= \text{Annuity} \times 5.11 \\ \$1,000,000 / 5.11 &= \text{Annuity} \\ \$195,700 &= \text{Annuity} \end{aligned}$$

The annuity is an annuity due (in advance) as the payments are made at the beginning of the year (interest period). The last payment would be made on September 1, 1993, the beginning of the last period which ends September 1, 1994. An ordinary annuity would have the last payment at the end of the last period (September 1, 1994).

16. (a)	Before tax annual cash inflow	\$10,000
	Less: depreciation (\$30,000 / 6 yrs.)	<u>5,000</u>
	Increase in income before tax	5,000
	Less: tax @ 40%	<u>2,000</u>
	Increase in net income after tax	\$ 3,000

$$\begin{aligned} \text{Accounting Rate of Return} &= \frac{\text{Net Income}}{\text{Investment}^*} \\ &= \frac{3,000}{30,000} \\ &= 10\% \end{aligned}$$

* Investment or average investment may be used. Note that the 20% rate of return based on average investment is not provided as an answer. When two or more methods may be used, the exam customarily provides only enough information for one method or only one method's answer.

17. (b)	Increase in net income	\$3,000
	Add: depreciation expense	<u>5,000</u>
	Annual cash flow after tax	\$8,000

$$\begin{aligned} \text{Payback period} &= \frac{\text{Cost of investment}}{\text{Annual Cash Flow}} = \frac{30,000}{8,000} \\ \text{Reciprocal of payback} &= \frac{8,000}{30,000} = .2666 \end{aligned}$$

Note: Where the cash flows are uniform and the economic life of the project is at least twice the payback period (not true in this case), the payback reciprocal approximates the rate of return.

18. (b)	Present value of Benefits (Annual Cash Flow)	
	8,000 × 3.785 =	\$30,280
	Less: Present value of investment	<u>30,000</u>
	Net Present Value	<u>\$ 280</u>

19. (b) The present value factor for an annuity of n years is equal to the sum of the individual, single sum, present value factors for each of the n years. Therefore, the difference between the present value annuity factors for n and n – 1 years is equal to the present value factor of a single sum to be received at the end of the nth year.

$$\begin{aligned} \text{PV annuity factor for 5 years @ 15\%} &= 3.353 \\ - \text{PV annuity factor for 4 years @ 15\%} &= \underline{2.856} \\ \text{PV factor for a single sum 5 years, 15\%} &= .497 \end{aligned}$$

The present value of 30,000 to be received 5 years from now given an interest rate of 15% compounded annually is determined as follows:

$$\begin{aligned} \text{PV} &= \text{FV} \times \text{PV factor} \\ \text{PV} &= \$30,000 \times .497 \\ \text{PV} &= \underline{\$14,910} \end{aligned}$$

20. (d) \$30,000 Residual income

Residual income is income from which an imputed interest charge for invested capital is deducted.

Darwin Division income		\$40,000
Less imputed interest on investment		
10% x \$100,000		<u>10,000</u>
Residual income		<u>\$30,000</u>

Invested Capital:

Capital turnover	=	Sales / Capital	=	4
4	=	\$400,000 / Capital	=	
Capital	=	\$400,000 / 4	=	<u>\$100,000</u>

21. (d) The internal rate of return method determines an investment's rate of return which is compared with a "specified rate of return" to determine acceptability. The IRR of an investment is that discount rate which equates the present value of the benefits to be received (cash flows) from the investment with the cost of the investment (initial cash outlay).

The net present value of an investment is the present value of the cash flows of an investment, discounted at a "specified rate of return,*" less the cost of the investment (initial cash outlay). Investments with NPV equal to or greater than zero are earning a rate of return equal to (NPV=0) or greater than (NPV>0) the discount rate used.

* The specified rate of return used is normally the cost of capital; however, other rates may be used.

22. (b) An investment's residual income is the accounting income from the investment less an allowance for a return on investment (invested capital).

23. (d) \$13,000 net present value.

Present value of benefit*		
\$20,000 5.65		\$113,000
– Investment (present value)		<u>100,000</u>
Net present value		<u>\$ 13,000</u>

* The accounting rate of return may also be based on average investment (Investment/2).

24. (d) 5.0 year payback period.

$$\begin{aligned} \text{Payback period} &= \frac{\text{Investment cost}}{\text{Annual cash flows}} \\ &= \frac{\$100,000}{\$20,000} = \underline{5.0 \text{ years}} \end{aligned}$$

25. (d) 10% accounting rate of return

$$\begin{aligned} \text{Accounting rate of return} &= \frac{\text{Average net income per year}}{\text{Investment}^*} \\ &= \frac{\$10,000}{\$100,000} \\ &= \underline{10\%} \end{aligned}$$

Average annual net income:

After tax annual cash savings	\$20,000
Less: depreciation expense	
\$100,000 10 years	<u>(10,000)</u>
Annual net income after tax	<u>\$10,000</u>

* The accounting rate of return may also be based on average investment (Investment/2).

26. (c) 5.0 internal rate of return factor.

The internal rate of return (time adjusted rate of return) is that discount rate at which the present value of the benefits equals the cost of the investment.

$$\begin{aligned} \text{Present value of benefit} &= \text{Investment} \\ \$20,000 \text{ benefit} \quad \text{PV factor} &= \$100,000 \\ \text{PV factor} &= \$100,000 / \$20,000 = \underline{5.0} \end{aligned}$$

27. (d) The payback period is the time needed to receive cash flow equal to the investment.

Investment = \$6,000

Cash Flow =

Additional revenue per year	\$1,200
Less: Depreciation (\$6,000 / 10)	<u>600</u>
Additional income	600
Tax at 50%	<u>300</u>
Additional net income	300
Add: Depreciation (non-cash)	<u>600</u>
Cash flow per year	<u>\$ 900</u>

$$\text{Payback} = \frac{\text{Investment}}{\text{Cash Flow}} = \frac{\$6,000}{900} = 6.7 \text{ years.}$$

28. (a)

$$\begin{aligned} \text{Accounting (unadjusted) rate of return} &= \frac{\text{Average net income per year}}{\text{Investment}} \\ &= \frac{\$300}{\$6,000} \\ &= 5\% \end{aligned}$$

29. (d) The internal rate of return of an investment is that discount rate which equates the present value of the benefits to be received (cash flows) from the investment with the cost of the investment (initial cash outlay). Residual sales value of a profit (salvage value) is an estimated cash flow in the last year of a project's expected economic life, and as such would be included in the project's benefits. Depreciation expense is not a cash flow item, therefore, it would be excluded in the calculation of the internal rate of return.

30. (b) 4.6 years.

Cash flow	\$9,000
Less: Depreciation 36,000 / 6	<u>6,000</u>
Taxable portion	\$3,000
Income tax @ 40%	1,200
Net cash flow \$9,000 - \$1,200	7,800
Payback: Investment \$36,000 / 7,800	= 4.6 years.

31. (a) \$59.

P.V. of annuity of \$1 in arrears at 8% for 6 years—4.623

Net cash flow \$9,000 - \$1,200 = \$7,800

P.V. of cash flow	\$7,800	4.623 = \$36,059
Investment		<u>36,000</u>
Net present value		\$ 59

32. (b) Less than 10%, but more than 0%.

The present value of a cash flow of \$10,000 per year for 5 years at 10% is \$10,000 / 3.791 or \$37,910. The present value must equal or exceed \$40,000, the amount of the investment to equal a return of 10% or more.

33. (b) Both the internal rate of return method and the net present value method of capital budgeting employ compound interest computations and tables, and these tables explicitly assume reinvestment at the interest rate used (refer to construction of compound interest tables in text). The net present value method uses the cost of capital as the discount rate and therefore assumes reinvestment at this rate which is the minimum rate of return allowable from investments. The internal rate of return provides for a discount rate equal to the rate of return earned by the project, which may be equal to, greater than, or less than the minimum rate of return allowable from investment. Therefore, the internal rate of return allows for reinvestment at a rate which may be greater or less than the minimum rate assured on investments.

34. (c) \$62,900.

<u>Period</u>	<u>Annuity</u>		<u>P.V. Factor</u>	=	<u>Present Value</u>
1-3	\$20,000	x	2.32	=	\$46,400
1-2	10,000	x	1.65	=	<u>16,500</u>
					<u>\$62,900</u>
		or			
1-2	\$30,000	x	1.65	=	\$49,500
3	20,000	x	.67*	=	<u>13,400</u>
					<u>\$62,900</u>

* 3rd period factor = 2.32 (3 period annuity factor)
 - 1.65 (2 period annuity factor)
 .67 (3 period single sum factor)

35. (b) Cost of machine		\$30,000
Less: Cash flow		
First 3 years \$7,000 3	\$21,000	
4th year	<u>5,500</u>	<u>26,500</u>
Required cash flow Year 5		<u>\$ 3,500</u>

36. (a) \$144,000 residual income.

Residual income is income from which an imputed interest charge for invested capital is deducted.

Sales		\$500,000
Less: Variable costs	\$300,000	
Traceable fixed costs	<u>50,000</u>	<u>350,000</u>
Division income		\$150,000
Less: Imputed interest on investment		
\$100,000 av. investment 6%		<u>6,000</u>
Residual income		<u>\$144,000</u>

37. (b) Present value of benefits:		
\$70,000 4.111	\$287,770	
Less: Cost of investment	<u>240,000</u>	
Net present value		<u>\$ 47,770</u>

38. (c) The internal rate of return method provides for a discount rate equal to the rate of return earned by the investment or project. Compound interest computations and tables employed by the internal rate of return method explicitly assume reinvestment at the interest rate used (refer to construction of compound interest tables in text).

39. (c) The ratio to determine the accounting rate of return is the annual operating income from the investment divided by either the initial increase or average investment. The numerator in this problem is \$40,000.

40. (b)	Net cash flow after taxes	\$25,000
	Less depreciation expense (\$100,000 / 10)	<u>10,000</u>
	Net income after taxes	\$15,000

$$\begin{aligned} \text{Accounting Rate of Return} &= \frac{\text{Net income}}{\text{initial investment}} \\ \text{(based on initial investment)} &= \frac{\$15,000}{\$100,000} \\ &= \underline{15\%} \end{aligned}$$

41. (c) The Net Present Value method discounts future cash flow benefits using the cost of capital as the discount rate. Answer (a) is incorrect as the payback method does not employ a discount rate. Answers (b) and (d) are incorrect as they are the same method and it solves for the discount rate which equates the investment cost and the future cash benefits.

$$\begin{aligned} 42. (a) \quad \text{Rate of return on investment} &= \frac{\text{Net income}}{\text{Average investment}} \\ &= \frac{\$20,000}{\$50,000} \\ &= \underline{40\%} \end{aligned}$$

Sales	\$620,000
Less: Variable costs	(500,000)
Traceable fixed cost	<u>(100,000)</u>
Net income	<u>\$ 20,000</u>

43. (c)	Net income (refer above)	\$20,000
	Less: Allowance for return on investment (18% \$50,000)	<u>9,000</u>
	Residual income	<u>\$11,000</u>

44. (a) The payback method is the original investment divided by cash flow after taxes, or \$5,000 divided by \$2,000 for a payback of 2.5 years. Payback does **not** utilize discounted cash flows, so the information regarding the time value of money is not needed to solve the problem.

45. (d) A, Accept; B, Reject.

Residual income is income from which an imputed interest charge for invested capital is deducted. Division A's project will earn a rate of return greater than the imputed interest charge for invested capital; therefore, it will have a positive residual income. Division B's project will have a negative residual income as the project's rate of return is less than the imputed interest charge for invested capital. If the objective is to maximize residual income, Division A's project should be accepted and Division B's project rejected.

46. (c) The net present value method discounts future cash inflows by a predetermined percentage (12%) and compares that amount to the cash outlay to acquire the investment. If there is a positive NPV, it means the rate of return is greater than the stated hurdle rate.

47. (d)	Computation of February cash collections:	
	Accounts receivable from January sales	\$ 38,000
	Collections on February sales (60% \$110,000)	<u>66,000</u>
	Budgeted cash collections for February	<u>\$104,000</u>

48. (c) Computation of February Net Income:

Sales		\$110,000
Less: Cost of goods sold (\$110,000 75%)		<u>82,500</u>
Gross profit		\$ 27,500
Less: Other expenses	\$16,500	
Depreciation	5,000	
Bad debts (\$110,000 2%)	<u>2,200</u>	<u>23,700</u>
Net income		<u>\$ 3,800</u>

49. (c) Purchases are 75% of the following months' sales and are paid for in the following month.

75% \$120,000 March sales = \$90,000

Purchases in February and accounts payable at Feb. 29

50. (c) \$306,000.

Cost of goods sold		\$300,000
+ Increase in inventory (\$30,000 vs. \$42,000)		<u>12,000</u>
Purchases		\$312,000
- Increase in accounts payable:		
Beginning balance	\$20,000	
Ending balance (312,000 12)	<u>26,000</u>	<u>(6,000)</u>
Cash Payments for purchases		<u>\$306,000</u>

51. (c) \$88,100

May cash collected	12%	\$100,000	\$12,000
April collections	75%	90,000	67,500
March collections	6%	80,000	4,800
February collections	4%	95,000	<u>3,800</u>
			\$88,100

52. (d) To determine cash disbursements, we need to look at costs or expenses. The gross margin is 40%, which means the cost of goods sold is 60% (1.00 less 40%). To that we add or subtract cash payments needed to change asset or liability accounts.

Sales	\$2,800,000
Cost of goods sold %	<u>60%</u>
Cost of goods sold	\$1,680,000
Less: cost of inventory on hand used	(70,000)
Add: cash paid to reduce accounts payable	<u>150,000</u>
	<u>\$1,760,000</u>

53. (c) By definition.

54. (c) \$629,000

Cash requirements for merchandise:

Sales	\$700,000	
Gross profit @ 30%	<u>210,000</u>	
Cost of sales	\$490,000	
Increase in inventory	<u>10,000</u>	\$500,000
Total SG&A expense:		
\$71,000 + (15% \$700,000) =	\$176,000	
Less: Charge for uncollectibles:		
1% 700,000	(7,000)	
Depreciation	<u>(40,000)</u>	<u>129,000</u>
Total cash requirements		\$629,000

The increase in accounts receivable does not require a cash outlay beyond that included in the cost of sales.

55. (c) The master budget is the budget plan for a planned level of operation.

Flexible budgeting is a reporting system wherein the planned level of activity is adjusted to the actual level of activity before the budget to actual comparison report is prepared.

56. (d) Collection on credit sales of

May 20%	\$200,000	\$ 40,000
April 70%	\$150,000	105,000
Prior to April		<u>12,000</u>
		<u>\$157,000</u>

57. (c)	Sales	125,000	units
	Less: Decrease in finished goods inventory	<u>(7,500)</u>	units
	Required production	117,500	units
	Add: Increase in work-in-process		
	(8,000 75%)	<u>6,000</u>	E.F.U.
	Production required	<u>123,500</u>	E.F.U.

(E.F.U. = Equivalent Finished Units)

58. (c) 186,000 Kilos

Budgeted sales - Oct.	53,000	units
+ Budgeted increase in finished goods inventory	<u>6,000</u>	
Budgeted production - Oct.	59,000	
Kilos per Loire per unit	<u>x 4</u>	
Budget Loire required in production	236,000	Kilos
- Budgeted decrease in Loire inventory	<u>(50,000)</u>	
Budgeted purchases of Loire - Oct.	<u>186,000</u>	Kilos

59. (a) Estimated May cash disbursements for inventory: Cost of goods sold

\$3,000,000 sale 75%*	\$2,250,000
Less decrease in inventory	<u>(140,000)</u>
Purchases of inventory	\$2,110,000
Add decrease in accounts payable	<u>240,000</u>
Total May disbursements for inventory	<u>\$2,350,000</u>

* If the gross profit is 25% of sales, cost of goods sold is 75% of sales (100% - 25%).

60. (b)	Sales	250,000	units
	+Ending inventory—finished goods	60,000	"
	-Beginning inventory—finished goods	<u>(75,000)</u>	"
	Required production	235,000	"
	+Ending inventory—work in process (16,000 75%)	12,000	EFU
	-Beginning inventory—work in process	<u>-0-</u>	
	Production required	<u>247,000</u>	EFU

61. (a) The E.O.Q. formula is: $EOQ = \sqrt{\frac{2SO}{C}}$, where

S	=	Total units sold / Demand during the period
O	=	Ordering costs per order
C	=	Carrying cost per unit

Periodic demand (S) for the goods is assumed to be known. Carrying costs and ordering costs are assumed to be constant. Therefore, answers (b) and (c) are incorrect. Purchase cost per unit is not part of the EOQ model; therefore, answer (d) is incorrect.

62. (c) Perfection, ignoring safety stocks, is to replenish supplies as they reach zero level.

63. (c) The economic order quantity is based upon demand (usage or sales), ordering cost per order (assumed constant) and carrying cost per unit of inventory (assumed constant).

$$EOQ = \sqrt{\frac{2SO}{C}}, \text{ where}$$

S	=	units sold or manufactured
O	=	cost per order (set-up cost)
C	=	cost of carrying one unit in inventory

64. (b) 10,000 units ordered $2 = \underline{5,000}$ units average inventory.

65. (a) Number of orders = $\frac{\text{Total Usage}}{\text{Units per order}} = \frac{2,000,000 \text{ units}}{10,000 \text{ units}} = 200 \text{ orders}$

Ordering costs = # orders cost per order = 200 \$80 = \$16,000

66. (a) A LIFO or FIFO inventory method will have no effect on the EOQ, because EOQ does not deal with pricing of inventory. It merely indicates the amount of inventory which should be purchased at one time in order to minimize carrying and ordering costs.

67. (c)

Q	=	Annual quantity in units
P	=	Cost of placing an order
S	=	Annual cost of storage for one unit

$$EOQ = \sqrt{\frac{2QP}{S}}$$

$$= \sqrt{\frac{2 \times 36,000 \times \$10}{\$.40 + (10\% \times \$20)}}$$

$$= \sqrt{300,000}$$

= approximately 548

Note that the annual cost of storage includes rent, taxes, insurance, etc., plus the cost of borrowing or the return that could be earned by an alternate investment of funds.

68. (d) Total annual inventory expenses:

1) Order costs:

Number of orders (36,000 / 800) =	45	
Cost per order	<u>\$10</u>	\$ 450

2) Inventory costs:

Average inventory (800 / 2) =	400 units	
Cost of storage for one unit	<u>\$2.40</u>	<u>960</u>
		<u>\$1,410</u>

69. (b) JIT inventory system results in more frequent, small orders and ideally eliminates inventory. A decrease in purchase order costs and/or an increase in inventory carry costs would make JIT more attractive.

70. (d) 693.

$$EOQ = \sqrt{\frac{2SO}{C}} = \sqrt{\frac{2(40,000)(\$60)}{\$10}}$$

$$EOQ = \sqrt{\frac{4,800,000}{10}} = \sqrt{480,000} = 693$$

The above may also be accomplished by trial and error as follows:

<i>Cost of ordering:</i>			<i>Cost of carrying:</i>		
(a) 40,000	400 = 100 orders	\$60 = \$6,000	400	2 = 200	\$10 = \$2,000
(b) 40,000	490 = 86 orders	\$60 = \$4,898	490	2 = 245	\$10 = \$2,450
(c) 40,000	600 = 67 orders	\$60 = \$4,000	600	2 = 300	\$10 = \$3,000
(d) 40,000	693 = 57 orders	\$60 = \$3,420	693	2 = 347	\$10 = \$3,470

71. (d)

$$EOQ = \sqrt{\frac{2 \cdot S \cdot O}{C}}$$

$$200 = \sqrt{\frac{2 \cdot 4000 \cdot 2}{C}}$$

$$40,000 = \frac{16,000}{C}$$

$$C = \underline{\$40}$$

72. (d) 7,200 annual usage / 240 days = 30 units per day

Reorder point equals maximum usage during lead time

30 units per day * 45 days = 1350

Safety stock equals the difference between maximum and normal usage during lead time.

Maximum usage	1350
Normal usage 30 * 20 days	<u>600</u>
	<u>750</u>

73. (d)	Annual usage	10,000
	Work days per year	<u>250</u>
	Average usage per day	40
	Lead time (days)	<u>30</u>
	Average usage during lead time	1,200
	Plus safety stock	<u>400</u>
	Reorder point	<u>1,600</u>

74. (b) The economic order quantity formula can be used to determine the optimum size of either a production run or purchase order. For production runs, the costs associated with setting up a production run are used in the numerator as "O". For purchase orders, the costs associated with placing an order are used in the numerator as "O".

75. (a) A just-in-time operation generally improves quality as defective inventory must be corrected immediately; there are no inventory pools to hold defective units. Therefore, inspection costs should decrease with a J.I.T. operation.

J.I.T. operations simplify accounting by charging costs directly to cost of goods sold (no inventory). If inventory exists, the inventory is "backed out" of the cost of goods sold account. Backing the inventory amount out of cost of goods sold is referred to as **backflush** accounting. This process decreases the detail of costs tracked to jobs.

76. (c) The balance scorecard approach is an outgrowth of the old goal congruence concept. In both ideas, the effort was to look at the tradeoffs associated with each decision. For example, a company may invest \$100,000 in a machine that is more efficient and increases profits versus investing in R&D. The decision may be the right one but at some point the scorecard has to be balanced and the company has to invest in R&D. A typical scorecard includes profitability; customer satisfaction; innovation; learning and growth; and efficiency, quality and time. Employee satisfaction and retention are a part of learning and growth.

77. (d) The creation of a mission statement is always the first step in the strategic planning process. The mission statement outlines the essential reasons for its existence. Choices (a), (b) and (c) are steps that follow the mission statement.

Chapter Fourteen

Solutions to Managerial Planning and Control Problems

NUMBER 1

1. Sales Budget—19X8

	<u>Units</u>	<u>Price</u>	<u>Total</u>
Thingone	60,000	\$70	\$4,200,000
Thingtwo	40,000	\$100	4,000,000
Projected sales			<u>\$8,200,000</u>

2. Production Budget (in units)—19X8

	<u>Thingone</u>	<u>Thingtwo</u>
Projected sales	60,000	40,000
Desired inventories December 31, 19X8	<u>25,000</u>	<u>9,000</u>
	85,000	49,000
Less expected inventories, January 1, 19X8	<u>20,000</u>	<u>8,000</u>
Production required (units)	<u>65,000</u>	<u>41,000</u>

3. Raw materials budget (in quantities)—19X8

	<u>Raw Material</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
Thingone (65,000 units projected to be produced)	260,000	130,000	—
Thingtwo (41,000 units projected to be produced)	<u>205,000</u>	<u>123,000</u>	<u>41,000</u>
Production requirements	465,000	253,000	41,000
Add desired inventories, December 31, 19X8	<u>36,000</u>	<u>32,000</u>	<u>7,000</u>
Total requirements	501,000	285,000	48,000
Less expected inventories, January 1, 19X8	<u>32,000</u>	<u>29,000</u>	<u>6,000</u>
Purchase requirements (units)	<u>469,000</u>	<u>256,000</u>	<u>42,000</u>

4. Raw Materials Purchase Budget—19X8

<u>Raw material required (units)</u>	<u>Anticipated purchase price</u>	<u>Total</u>
A—469,000	\$8	\$3,752,000
B—256,000	\$5	\$1,280,000
C— 42,000	\$3	\$ 126,000

5. Direct Labor Budget—19X8

	<u>Projected production (units)</u>	<u>Hours per unit</u>	<u>Total</u>	<u>Rate</u>	<u>Total</u>
Thingone	65,000	2	130,000	\$3	\$390,000
Thingtwo	41,000	3	123,000	\$4	\$492,000
					<u>\$882,000</u>

6. Budgeted Finished Goods Inventory—December 31, 19X8

Thingone

Raw materials			
A—4 pounds @ \$8	\$32		
B—2 pounds @ \$5	<u>\$10</u>	\$42	
Direct labor—2 hours @ \$3		6	
Overhead—2 hours @ \$2 per direct labor hour		<u>4</u>	
		<u>\$52</u>	
\$52 × 25,000 units =			\$1,300,000

Thingtwo

Raw materials			
A—5 pounds @ \$8	\$40		
B—3 pounds @ \$5	\$15		
C—1 each @ \$3	<u>\$ 3</u>	\$58	
Direct labor—3 hours @ \$4		12	
Overhead—3 hours @ \$2 per direct labor hour		<u>6</u>	
		<u>\$76</u>	
\$76 × 9,000 units =			<u>684,000</u>
Budgeted finished goods inventory, December 31, 19X8			<u>\$1,984,000</u>

NUMBER 2

1. The advantages of the payback method are these:

- It is simple to compute.
- It is easy to understand.
- It may be used to select those investments yielding a quick return of cash.
- It permits a company to determine the length of time required to recapture its original investment.
- The reciprocal of the payback period may be used under certain conditions as a rough approximation of the rate of return calculated by the internal rate-of-return method. The approximation is valid when the project's life is long, approximately double or more that of the payback period, and when the annual savings and/or cash inflow are relatively uniform in amount.

The disadvantages of the payback method are these:

- It ignores the time value of money.
- It ignores cash flow, including salvage value, which may be produced beyond the payback period.

2. Other capital budgeting techniques that could be used are the accounting rate-of-return (average annual return on investment) method, and the two discounted cash flow methods—net present value and internal rate of return.

NUMBER 3

1.

Montero Corporation
EXPECTED CASH COLLECTIONS
May 2000

<u>Month</u>	<u>Sales</u>	<u>Percent</u>	<u>Expected collections</u>
March	\$60,000	9	\$ 5,400
April	78,000	20	15,600
May	66,000	70	<u>46,200</u>
Total			<u>\$67,200</u>

2.

Montero Corporation
EXPECTED CASH DISBURSEMENTS
May 2000

April purchases to be paid in May	\$54,000
Less: 2% cash discount	<u>1,080</u>
Net	\$52,920
Cash disbursements for expenses	<u>14,400</u>
Total	<u>\$67,320</u>

3.

Montero Corporation
EXPECTED CASH BALANCE
May 31, 2000

Balance, May 1		\$22,000
Expected collections	\$67,200	
Expected disbursements	<u>67,320</u>	<u>(120)</u>
Expected balance		<u>\$21,880</u>

NUMBER 4

- Both the net present value method and the internal rate-of-return method have the following advantages over the payback method:
 - Consider the time value of money.
 - Consider cash flow over the entire life of the project.
- The limitations of the net present value method are as follows:
 - It is more difficult to use than other less sophisticated capital budgeting techniques.
 - The discount rate (hurdle rate of return) must be determined in advance.
 - Certainty about cash flow is assumed.
 - Cash flows are reinvested at the discount rate (hurdle rate of return).
- The limitations of the internal rate-of-return method are as follows:
 - It is more difficult to use than other less sophisticated capital budgeting techniques.
 - Cash flows are reinvested at the rate earned by the investment.
 - Certainty about cash flow is assumed.
- Depreciation is excluded from the calculations for both the net present value method and the internal rate-of-return method. Deduction of depreciation would constitute a double-counting of a cost that has already been considered as a lump-sum outflow (the initial cost of the asset). Both the net present value method and the internal rate-of-return method focus on cash flow, while depreciation is an allocation of past cost and is not a cash flow.

NUMBER 5

a.

Spara Corp.
RELEVANT ANNUAL AFTER-TAX CASH FLOWS
CAD/CAM PROJECT

Savings on elimination of current manual system (20,000 hrs. @ \$20)		\$400,000
Operating costs of CAD/CAM system	\$200,000	
Depreciation of CAD/CAM system (\$480,000/6)	<u>80,000</u>	<u>280,000</u>
Pre-tax savings		120,000
Less income taxes (\$120,000 × 30%)		<u>36,000</u>
Increase in reported income		84,000
Add depreciation		<u>80,000</u>
Increase in annual net cash flows		<u>\$164,000</u>

b.1.

PAYBACK PERIOD

Cost, \$480,000/Increase in annual net cash flows, \$164,000 2.93 years

b.2.

INTERNAL RATE OF RETURN

<u>Rate</u>	<u>Annual</u> <u>cash flows</u>	<u>Factor</u>	<u>Present value</u>	<u>Investment</u>	<u>Difference</u>
24%	\$164,000	3.020	\$495,280	\$480,000	<u>\$15,280</u>
<u>26%</u>	164,000	2.885	<u>473,140</u>		
<u>2%</u>			<u>\$ 22,140</u>		

Interpolation:

$$\frac{15,280}{22,140} \times .02 = .0138$$

Internal rate of return (.24 + .0138) = 25.38%

b.3.

NET PRESENT VALUE

Present value of annual net cash flows (\$164,000 × 3.326)		\$545,464
Less investment		<u>480,000</u>
Net present value		<u>\$ 65,464</u>

b.4.

EXCESS PRESENT VALUE INDEX

Present value of annual net cash flows	\$545,464			
Investment	\$480,000	=		<u>114%</u>

NUMBER 6

1. B. The payback period is the time needed to receive net cash inflows from an investment equal to the initial cash outflow for the investment. Projects A and B have the same initial investment requirements and lives. Diagram I shows Project B produces most of its net cash inflows in the first three years and that this amount is substantially greater than that of Project A during this time. Although Project A provides the greater total net cash inflows, most of it is produced during the last two years. Therefore, it is most likely that Project B has the shorter payback period.
2. A. The Average Accounting Rate of Return is equal to the average annual net income divided by the average investment. As Projects A and B have the same initial investment requirements and lives, they will have the same depreciation expense and average investment. As Project A has the greater total net cash inflow, it will have the greater average annual income and greater Average Accounting Rate of Return.
3. B. The Internal Rate of Return is the discount rate which produces a zero net present value for an investment. Diagram II shows Project A has a zero N.P.V. at approximately 16% and Project B has a zero N.P.V. at approximately 22%. Project B has the greater internal rate of return.
4. B. If the projects were to terminate at the end of four years, Project A would lose its greatest cash flows while Project B would lose its smallest cash flows. When discounted, Project A would have the greatest loss in present value; therefore, Project B would still have the greater present value and internal rate of return.

NUMBER 7

a. 1.

Lane College
PROJECTED ENROLLMENT
For the Academic Year 1990-91

	<u>Undergraduate</u>	<u>Graduate</u>	<u>Total</u>
Enrollment for 1989-90	4,200	1,300	5,500
Projected increase for 1990-91—5%	210	65	275
<u>TA enrollment for 1990-91</u>			
Average number of undergraduate students per class	25		
Average faculty teaching load in credit hours	× 24		
Product	<u>600</u>		
One-half	<u>300</u>		
Projected increase in undergraduate enrollment for 1990-91	210		
Average number of credit hours carried by each undergraduate student	× 30		
Product	<u>6,300</u>		
TA enrollment (6,300/300)		<u>21</u>	<u>21</u>
Total expected enrollment	<u>4,410</u>	<u>1,386</u>	<u>5,796</u>

a. 2.

Lane College
PROJECTED STUDENT CREDIT HOURS
For the Academic Year 1990-91

	<u>Undergraduate</u>	<u>Graduate</u>	<u>Total</u>
Expected enrollment, excluding TA's	4,410	1,365	5,775
Average number of credit hours carried by each student	× <u>30</u>	× <u>24</u>	
Credit hours, excluding TA's	132,300	32,760	165,060
TA credit hours [21 × (½ of 24)]		<u>252</u>	<u>252</u>
Total student credit hours	<u>132,300</u>	<u>33,012</u>	<u>165,312</u>

a. 3.

Lane College
PROJECTED NUMBER OF FULL-TIME FACULTY AND TA'S
For the Academic Year 1990-91

	<u>Full-time</u>	<u>TA's</u>
<i>For undergraduate program</i>		
Enrollment for 1989-90	4,200	
Average number of credit hours carried by each student	× <u>30</u>	
Total undergraduate credit hours	<u>126,000</u>	
Average number of undergraduate students per class	25	
Average faculty teaching load in credit hours	× <u>24</u>	
Total credit hours taught by faculty	<u>600</u>	
Required full-time faculty (126,000/600)	210	
TA's for projected increase in undergraduate enrollment for 1990-91:		
Projected enrollment increase	210	
Average number of credit hours carried by each student	× <u>30</u>	
Increased number of credit hours	<u>6,300</u>	
Average faculty teaching load	600	
One-half carried by TA's	× <u>.5</u>	
TA teaching load	<u>300</u>	
Required number of TA's (6,300/300)		21
<i>For graduate program</i>		
Enrollment for 1990-91 (excluding TA's)	1,365	
Average number of credit hours carried by each student	× <u>24</u>	
Graduate credit hours (excluding TA's)	32,760	
TA credit hours [21 × (½ of 24)]	<u>252</u>	
Total graduate credit hours	<u>33,012</u>	
Average number of students per class	14	
Average faculty teaching load	× <u>18</u>	
Total credit hours taught by faculty	<u>252</u>	
Required full-time faculty (33,012/252)	<u>131</u>	
Total required full-time faculty and TA's	<u>341</u>	<u>21</u>

a. 4.

Lane College
**PROJECTED SALARIES AND BENEFITS
 FOR FULL-TIME FACULTY AND TA'S**
For the Academic Year 1990-91

	<u>Undergraduate</u>	<u>Faculty</u>	<u>Graduate</u>	<u>Total</u>
Full-time 210 × (\$50,000 × 1.03)	\$10,815,000			\$10,815,000
TA's 21 × \$10,000	210,000			210,000
Full-time 131 × (\$60,000 × 1.03)			\$8,095,800	8,095,800
Total salaries and benefits	<u>\$11,025,000</u>		<u>\$8,095,800</u>	<u>\$19,120,800</u>

a. 5.

Lane College
PROJECTED TUITION REVENUE
For the Academic Year 1990-91

<u>Undergraduate</u>		
132,300 student credit hours × \$200 per credit hour		\$26,460,000
<u>Graduate</u>		
33,012 student credit hours × \$300 per credit hour		<u>9,903,600</u>
Total projected tuition revenue		<u>\$36,363,600</u>

b. 1.

Lane College
**FIXED AND VARIABLE ELEMENTS
 IN NON-FACULTY COSTS**
For the Academic Year 1990-91

Estimated non-faculty costs at level of 180,000 credit hours	\$22,320,000
Estimated non-faculty costs at level of <u>140,000</u> credit hours	<u>21,960,000</u>
Difference between two levels <u>40,000</u>	<u>\$ 360,000</u>

Variable costs per credit hour = $360,000 / 40,000 = \$9$
 Fixed costs = $\$22,320,000 - \$9 (180,000) = \$20,700,000$
 or
 $\$21,960,000 - \$9 (140,000) = \$20,700,000$

b. 2.

Lane College
BUDGETED NON-FACULTY COSTS
For the Academic Year 1990-91

Fixed costs	\$20,700,000
Variable costs (165,312 credit hours × \$9)	1,487,808
Scholarships (21 TA's × 12 credits × \$300 per credit)	<u>75,600</u>
Total budgeted non-faculty costs	<u>\$22,263,408</u>