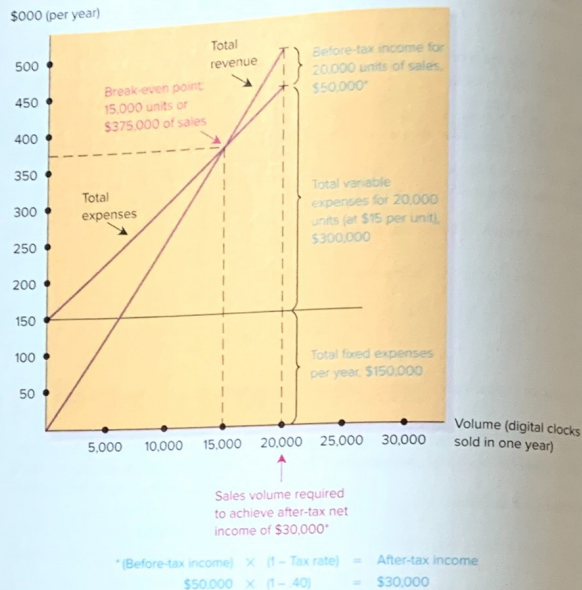


Exhibit 7-11

Cost-Volume-Profit Graph
(with income taxes)

Digital:Time



Review Questions

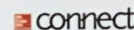
- 7-1. Briefly explain each of the following methods of computing a break-even point in units: (a) contribution-margin approach, (b) equation approach, and (c) graphical approach.
- 7-2. What is the meaning of the term *unit contribution margin*? Contribution to what?
- 7-3. What information is conveyed by a cost-volume-profit graph in addition to a company's break-even point?
- 7-4. What does the term *safety margin* mean?
- 7-5. Suppose the fixed expenses of a travel agency increase. What will happen to its break-even point, measured in number of clients served? Why?
- 7-6. Delmarva Oyster Company has been able to decrease its variable expenses per pound of oysters harvested. How will this affect the firm's break-even sales volume?
- 7-7. In a strategy meeting, a manufacturing company's president said, "If we raise the price of our product, the company's break-even point will be lower." The financial vice president responded by saying, "Then we should raise our price. The company will be less likely to incur a loss." Do you agree with the president? Why? Do you agree with the financial vice president? Why?
- 7-8. What will happen to a company's break-even point if the sales price and unit variable cost of its only product increase by the same dollar amount?
- 7-9. An art museum covers its operating expenses by charging a small admission fee. The objective of the nonprofit organization is to break even. A local arts enthusiast has just pledged an annual donation of \$10,000 to the museum. How will the donation affect the museum's break-even attendance level?
- 7-10. How can a profit-volume graph be used to predict a company's profit for a particular sales volume?
- 7-11. List the most important assumptions of cost-volume-profit analysis.
- 7-12. Why do many operating managers prefer a contribution income statement instead of a traditional income statement?
- 7-13. What is the difference between a manufacturing company's *gross margin* and its *total contribution margin*?
- 7-14. East Company manufactures VCRs using a completely automated production process. West Company also manufactures VCRs, but its products are assembled manually. How will these two firms' cost structures differ? Which company will have a higher operating leverage factor?
- 7-15. When sales volume increases, which company will experience a larger percentage increase in profit: company X, which has mostly fixed expenses, or company Y, which has mostly variable expenses?

- 7-16. What does the term *sales mix* mean? How is a *weighted-average unit contribution margin* computed?
- 7-17. A car rental agency rents subcompact, compact, and full-size automobiles. What assumptions would be made about the agency's sales mix for the purpose of a cost-volume-profit analysis?
- 7-18. How can a hotel's management use cost-volume-profit analysis to help in deciding on room rates?
- 7-19. How could cost-volume-profit analysis be used in budgeting? In making a decision about advertising?

- 7-20. Two companies have identical fixed expenses, unit variable expenses, and profits. Yet one company has set a much lower price for its product. Explain how this can happen.
- 7-21. A company with an advanced manufacturing environment typically will have a higher break-even point, greater operating leverage, and larger safety margin than a labor-intensive firm. True or false? Explain.
- 7-22. Explain briefly how activity-based costing (ABC) affects cost-volume-profit analysis.

Exercises

All applicable Exercises are available in Connect.



Fill in the missing data for each of the following independent cases. (Ignore income taxes.)

	Sales Revenue	Variable Expenses	Total Contribution Margin	Fixed Expenses	Net Income	Break-Even Sales Revenue
1.	?	\$40,000	?	\$30,000	?	\$40,000
2.	\$80,000	?	\$15,000	?	?	80,000
3.	?	40,000	80,000	?	\$50,000	?
4.	110,000	22,000	?	?	38,000	?

Exercise 7-23

Fill in Blanks; Basic CVP Relationships
(LO 7-1, 7-2)

Exercise 7-24

Pizza Delivery Business; Basic CVP Analysis
(LO 7-1, 7-2, 7-4)

College Pizza delivers pizzas to the dormitories and apartments near a major state university. The company's annual fixed expenses are \$40,000. The sales price of a pizza is \$10, and it costs the company \$5 to make and deliver each pizza. (In the following requirements, ignore income taxes.)

Required:

1. Using the contribution-margin approach, compute the company's break-even point in units (pizzas).
2. What is the contribution-margin ratio?
3. Compute the break-even sales revenue. Use the contribution-margin ratio in your calculation.
4. How many pizzas must the company sell to earn a target profit of \$65,000? Use the equation method.

Rosario Company, which is located in Buenos Aires, Argentina, manufactures a component used in farm machinery. The firm's fixed costs are 4,000,000 *p* per year. The variable cost of each component is 2,000 *p*, and the components are sold for 3,000 *p* each. The company sold 5,000 components during the prior year. (*p* denotes the peso, Argentina's national currency. Several countries use the peso as their monetary unit. On the day this exercise was written, Argentina's peso was worth .104 U.S. dollar. In the following requirements, ignore income taxes.)

Required: Answer requirements (1) through (4) independently.

1. Compute the break-even point in units.
2. What will the new break-even point be if fixed costs increase by 10 percent?
3. What was the company's net income for the prior year?
4. The sales manager believes that a reduction in the sales price to 2,500 *p* will result in orders for 1,200 more components each year. What will the break-even point be if the price is changed?
5. Should the price change discussed in requirement (4) be made?

The Houston Armadillos, a minor-league baseball team, play their weekly games in a small stadium just outside Houston. The stadium holds 10,000 people and tickets sell for \$10 each. The franchise owner estimates that the team's annual fixed expenses are \$180,000, and the variable expense per ticket sold is \$1. (In the following requirements, ignore income taxes.)

Exercise 7-25

Manufacturing; Using CVP Analysis
(LO 7-1, 7-4)

Exercise 7-26

Sports Franchise; CVP Graph
(LO 7-3, 7-4)

Required:

1. Draw a cost-volume-profit graph for the sports franchise. Label the axes, break-even point, profit and loss areas, fixed expenses, variable expenses, total-expense line, and total-revenue line.
2. If the stadium is half full for each game, how many games must the team play to break even?

■ Exercise 7-27

Continuation of Preceding Exercise; Profit-Volume Graph; Safety Margin (LO 7-3, 7-4)

Refer to the data given in the preceding exercise. (Ignore income taxes.)

Required:

1. Prepare a fully labeled profit-volume graph for the Houston Armadillos.
2. What is the safety margin for the baseball franchise if the team plays a 12-game season and the team owner expects the stadium to be 30 percent full for each game?
3. If the stadium is half full for each game, what ticket price would the team have to charge in order to break even?

■ Exercise 7-28

Publishing; Contribution Income Statement (LO 7-7, 7-8)

Europa Publications, Inc. specializes in reference books that keep abreast of the rapidly changing political and economic issues in Europe. The results of the company's operations during the prior year are given in the following table. All units produced during the year were sold. (Ignore income taxes.)

Sales revenue	\$2,000,000
Manufacturing costs:	
Fixed	500,000
Variable	1,000,000
Selling costs:	
Fixed	50,000
Variable	100,000
Administrative costs:	
Fixed	120,000
Variable	30,000

Required:

1. Prepare a traditional income statement and a contribution income statement for the company.
2. What is the firm's operating leverage for the sales volume generated during the prior year?
3. Suppose sales revenue increases by 10 percent. What will be the percentage increase in net income?
4. Which income statement would an operating manager use to answer requirement (3)? Why?

■ Exercise 7-29

Retail; CVP Analysis with Multiple Products (LO 7-1, 7-2, 7-5)

Tim's Bicycle Shop sells 21-speed bicycles. For purposes of a cost-volume-profit analysis, the shop owner has divided sales into two categories, as follows:

Product Type	Sales Price	Invoice Cost	Sales Commission
High-quality	\$500	\$275	\$25
Medium-quality	300	135	15

Three-quarters of the shop's sales are medium-quality bikes. The shop's annual fixed expenses are \$65,000. (In the following requirements, ignore income taxes.)

Required:

1. Compute the unit contribution margin for each product type.
2. What is the shop's sales mix?
3. Compute the weighted-average unit contribution margin, assuming a constant sales mix.
4. What is the shop's break-even sales volume in dollars? Assume a constant sales mix.
5. How many bicycles of each type must be sold to earn a target net income of \$48,750? Assume a constant sales mix.

Use the Internet to access the website of one of these airlines, or a different airline of your choosing.

American Airlines	www.aa.com
British Airways	www.britishairways.com
Delta Air Lines	www.delta.com
Southwest Airlines	www.southwest.com

Required: Find the company's most recent annual report. Does the management discussion in the report disclose the airline's break-even load factor? If so, what is it for the most recent year reported?

A contribution income statement for the Nantucket Inn is shown below. (Ignore income taxes.)

Revenue	\$500,000
Less: Variable expenses	300,000
Contribution margin	\$200,000
Less: Fixed expenses	150,000
Net income	\$ 50,000

Required:

1. Show the hotel's cost structure by indicating the percentage of the hotel's revenue represented by each item on the income statement.
2. Suppose the hotel's revenue declines by 15 percent. Use the contribution-margin percentage to calculate the resulting decrease in net income.
3. What is the hotel's operating leverage factor when revenue is \$500,000?
4. Use the operating leverage factor to calculate the increase in net income resulting from a 20 percent increase in sales revenue.

Refer to the income statement given in the preceding exercise. Prepare a new contribution income statement for the Nantucket Inn in each of the following independent situations. (Ignore income taxes.)

1. The hotel's volume of activity increases by 20 percent, and fixed expenses increase by 40 percent.
2. The ratio of variable expenses to revenue doubles. There is no change in the hotel's volume of activity. Fixed expenses decline by \$25,000.

Hydro Systems Engineering Associates, Inc. provides consulting services to city water authorities. The consulting firm's contribution-margin ratio is 20 percent, and its annual fixed expenses are \$120,000. The firm's income-tax rate is 40 percent.

Required:

1. Calculate the firm's break-even volume of service revenue.
2. How much before-tax income must the firm earn to make an after-tax net income of \$48,000?
3. What level of revenue for consulting services must the firm generate to earn an after-tax net income of \$48,000?
4. Suppose the firm's income-tax rate rises to 45 percent. Explain what will happen to the break-even level of consulting service revenue.

Problems

All applicable Problems are available in Connect.

Disk City, Inc. is a retailer for digital video disks. The projected net income for the current year is \$200,000 based on a sales volume of 200,000 video disks. Disk City has been selling the disks for \$16 each. The variable costs consist of the \$10 unit purchase price of the disks and a handling cost of \$2 per disk. Disk City's annual fixed costs are \$600,000.

Management is planning for the coming year, when it expects that the unit purchase price of the video disks will increase 30 percent. (Ignore income taxes.)

■ Exercise 7-30

Cost-Volume-Profit Analysis in an Airline; Use of Internet (LO 7-4)



■ Exercise 7-31

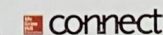
Hotel and Restaurant; Cost Structure and Operating Leverage (LO 7-2, 7-4, 7-8)

■ Exercise 7-32

Continuation of Preceding Exercise (LO 7-4, 7-7)

■ Exercise 7-33

Consulting Firm; CVP Analysis with Income Taxes (Appendix) (LO 7-1, 7-4, 7-11)



■ Problem 7-34

Basic CVP Relationships; Retailer (LO 7-1, 7-2, 7-4)

2. Net income: \$280,000

Required:

1. Calculate Disk City's break-even point for the current year in number of video disks.
2. What will be the company's net income for the current year if there is a 10 percent increase in projected unit sales volume?
3. What volume of sales (in dollars) must Disk City achieve in the coming year to maintain the same net income as projected for the current year if the unit selling price remains at \$16?
4. In order to cover a 30 percent increase in the disk's purchase price for the coming year and still maintain the current contribution-margin ratio, what selling price per disk must Disk City establish for the coming year?
5. **Build a spreadsheet:** Construct an Excel spreadsheet to solve requirements (1), (2), and (3) above. Show how the solution will change if the following information changes: the selling price is \$17 and the annual fixed costs are \$640,000.

(CMA, adapted)

■ Problem 7-35

Basic CVP Computations

(LO 7-1, 7-2, 7-4)

2. Sales units required for \$180,000 income: 54,000 units

CollegePak Company produced and sold 60,000 backpacks during the year just ended at an average price of \$20 per unit. Variable manufacturing costs were \$8 per unit, and variable marketing costs were \$4 per unit sold. Fixed costs amounted to \$180,000 for manufacturing and \$72,000 for marketing. There was no year-end work-in-process inventory. (Ignore income taxes.)

Required:

1. Compute CollegePak's break-even point in sales dollars for the year.
2. Compute the number of sales units required to earn a net income of \$180,000 during the year.
3. CollegePak's variable manufacturing costs are expected to increase by 10 percent in the coming year. Compute the firm's break-even point in sales dollars for the coming year.
4. If CollegePak's variable manufacturing costs do increase by 10 percent, compute the selling price that would yield the same contribution-margin ratio in the coming year.

(CMA, adapted)

■ Problem 7-36

CVP Relationships; Indifference Point

(LO 7-1, 7-4)

2. Net income, model no. 4399: \$1,094,400

Corrigan Enterprises is studying the acquisition of two electrical component insertion systems for producing its sole product, the universal gismo. Data relevant to the systems follow.

Model no. 6754:
Variable costs, \$16.00 per unit
Annual fixed costs, \$985,600

Model no. 4399:
Variable costs, \$12.80 per unit
Annual fixed costs, \$1,113,600

Corrigan's selling price is \$64 per unit for the universal gismo, which is subject to a 5 percent sales commission. (In the following requirements, ignore income taxes.)

Required:

1. How many units must the company sell to break even if Model 6754 is selected?
2. Which of the two systems would be more profitable if sales and production are expected to average 46,000 units per year?
3. Assume Model 4399 requires the purchase of additional equipment that is not reflected in the preceding figures. The equipment will cost \$450,000 and will be depreciated over a five-year life by the straight-line method. How many units must Corrigan sell to earn \$956,400 of income if Model 4399 is selected? As in requirement (2), sales and production are expected to average 46,000 units per year.
4. Ignoring the information presented in requirement (3), at what volume level will management be indifferent between the acquisition of Model 6754 and Model 4399? In other words, at what volume level will the annual total cost of each system be equal? (Hint: At any given sales volume, sales commissions will be the same amount regardless of which model is selected.)

Houston-based Advanced Electronics manufactures audio speakers for desktop computers. The following data relate to the period just ended when the company produced and sold 42,000 speaker sets:

Sales	\$3,360,000
Variable costs	840,000
Fixed costs	2,280,000

Management is considering relocating its manufacturing facilities to northern Mexico to reduce costs. Variable costs are expected to average \$18 per set; annual fixed costs are anticipated to be \$1,984,000. (In the following requirements, ignore income taxes.)

Required:

1. Calculate the company's current income and determine the level of dollar sales needed to double that figure, assuming that manufacturing operations remain in the United States.
2. Determine the break-even point in speaker sets if operations are shifted to Mexico.
3. Assume that management desires to achieve the Mexican break-even point; however, operations will remain in the United States.
 - a. If variable costs remain constant, what must management do to fixed costs? By how much must fixed costs change?
 - b. If fixed costs remain constant, what must management do to the variable cost per unit? By how much must unit variable cost change?
4. Determine the impact (increase, decrease, or no effect) of the following operating changes.
 - a. Effect of an increase in direct material costs on the break-even point.
 - b. Effect of an increase in fixed administrative costs on the unit contribution margin.
 - c. Effect of an increase in the unit contribution margin on net income.
 - d. Effect of a decrease in the number of units sold on the break-even point.

Lawrence Corporation sells two ceiling fans, Deluxe and Basic. Current sales total 60,000 units, consisting of 39,000 Deluxe units and 21,000 Basic units. Selling price and variable cost information follow.

	Deluxe	Basic
Selling price	\$86	\$74
Variable cost	65	41

Salespeople currently receive flat salaries that total \$400,000. Management is contemplating a change to a compensation plan that is based on commissions in an effort to boost the company's presence in the marketplace. Two plans are under consideration:

- Plan A: 10% commission computed on gross dollar sales. Deluxe sales are expected to total 45,500 units; Basic sales are anticipated to be 19,500 units.
- Plan B: 30% commission computed on the basis of production contribution margins. Deluxe sales are anticipated to be 26,000 units; Basic sales are expected to total 39,000 units.

Required:

1. Define the term *sales mix*.
2. Comparing Plan A to the current compensation arrangement:
 - a. Will Plan A achieve management's objective of an increased presence in the marketplace? Briefly explain.
 - b. From a sales-mix perspective, will the salespeople be promoting the product that one would logically expect? Briefly discuss.
 - c. Will the sales force likely be satisfied with the results of Plan A? Why?
 - d. Will Lawrence likely be satisfied with the resulting impact of Plan A on company profitability? Why?

■ Problem 7-37

CVP Analysis; Impact of Operating Changes

(LO 7-1, 7-4)

2. Break-even point: 32,000 units



■ Problem 7-38

Sales Mix and Employee Compensation; Operating Changes

(LO 7-4, 7-5)

- 2(c). Commissions, total: \$535,600