LEARNING OBJECTIVES

LO 1	What factors are relevant in making decisions and why?
LO 2	What factors are relevant in making decisions and why?
LO 3	What are the relevant considerations in outsourcing?
LO 4	How can management make the best use of a scarce resource?
LO 5	How does sales mix pertain to relevant costing problems?
LO 6	How are special prices set, and when are they used?
LO 7	How is segment margin used to determine whether a product line should be retained or eliminated?
LO 8	(Appendix) How is a linear programming problem formulated?

QUESTION GRID

True/False

	Difficulty Level			Learning Objectives							
	Easy	Moderate	Difficult	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8
1	x			x							
2	x			x							
3	x				x						
4	x					x					
5	x					x					
6		x				x					
7		x				x					
8		x				x					
9		x				x					
10		x						x			
11		x						x			
12		x							x		
13		x							x		
14	x								x		
15	x									x	
16	x									x	
17		x								x	
18		x								x	
19	x										x
20	x										x
21	x										x
22	x										x
23		x									x
24		x									x
25		x									x
26		x									x
27		x									x
28		x									x

Completion											
	Difficulty Level			Learning Objectives							
	Easy	Moderate	Difficult	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8
1	x			x							
2	x			x							
3	x			x							
4	x				x						
5	x					x					
6	x							x			
7	x									x	
8	x										x
9	x										x
10		x									x
11		x									x

Multiple Choice

	Difficulty Level			Learning Objectives							
	Easy	Moderate	Difficult	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8
1	x			x							
2	x			x							
3	x			x							
4	x				x						
5	x				x						
6	x				x						
7	x				x						
8	x				x						
9	x				x						
10	x				x						
11	x				x						
12	x					x					
13	x					x					
14	x					x					
15	x					x					
16	x					x					
17	x					x					
18	x					x					
19	x						x				
20	x						x				
21	x								x		
22	x								x		
23	x								x		
24		x							x		
25	x									x	
26	x									x	
27	x									x	
28	x									x	
29	x									x	
30	x									x	
31		x				x					
32			x							x	
33		x								x	

	Difficulty Level			Learning Objectives							
	Easy	Moderate	Difficult	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8
34		x							x		
35		x				x					
36	x					x					
37	x								x		
38		x				x					
39	x							x			
40	x							x			
41		x								x	
42	x			x							
43	x				x						
44	x					x					
45	x					x					
46	x					x					
47		x						x			
48		x						x			
49		x							x		
50		x							x		
51		x							x		
52	x			x							
53	x			x							
54		x		x							
55		x				x					
56		x							x		
57	x										x
58	x										x
59	x										x
60	x										x
61	x										x
62	x										x
63	x										x
64	x										x
65	x										x
66	x										x
67	x										x
68	x										x
69		x									x
70		x									x
71	x										x
72	x										x
73		x									x
74	x					x					
75	x					x					
76	x					x					
77	x			x							
78	x			x							

Short-Answer

	Difficulty Level			Learning Objectives							
	Easy	Moderate	Difficult	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8
1	x			x							
2		x			x						
3		x		x							
4		x								x	
5		x					x				
6		x							x		
7		x			x						
8		x				x					
9		x						x			

Problem

	Difficulty Level			Learning Objectives							
	Easy	Moderate	Difficult	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8
1		x				x					
2		x						x			
3		x						x			
4		x		x							
5		x						x		x	
6		x				x					
7		x				x					
8			x			x					
9			x								x

TRUE/FALSE

1. Information that is related to past events is relevant in the decision-making process.

   ANS: F DIF: Easy OBJ: 10-1

2. Information that has a bearing on future events is relevant in the decision-making process.

   ANS: T DIF: Easy OBJ: 10-1

3. In evaluating alternative courses of action, a manager should select the alternative that provides the highest incremental benefit to the company.

   ANS: T DIF: Easy OBJ: 10-2

4. The outsourcing decision is also referred to as a "make-or-buy" decision.

   ANS: T DIF: Easy OBJ: 10-3

5. A company may outsource some of its production in order to focus on core competencies.

   ANS: T DIF: Easy OBJ: 10-3

6. In an outsourcing decision, unavoidable fixed costs are irrelevant.

   ANS: T DIF: Moderate OBJ: 10-3

7. In an outsourcing decision, avoidable fixed costs are irrelevant.

   ANS: F DIF: Moderate OBJ: 10-3

8. In an outsourcing decision, variable costs of production are relevant.

   ANS: T DIF: Moderate OBJ: 10-3

9. In an outsourcing decision, rent received from an outside party for facility use is a relevant cash inflow.

   ANS: T DIF: Moderate OBJ: 10-3

10. When multiple products are produced and sold, a change in the sales price of one product will cause a change in the sales mix of the firm.

    ANS: T DIF: Moderate OBJ: 10-5

11. In setting compensation structures, fixed salary expense is normally not considered.

    ANS: T DIF: Moderate OBJ: 10-5

12. In a special order decision, unavoidable fixed costs are taken into consideration in setting a sales price.

    ANS: F DIF: Moderate OBJ: 10-6

13. In a special order decision, the sales price should be sufficient to cover a job's variable costs, incremental fixed costs, and generate a profit.

ANS: T DIF: Moderate OBJ: 10-6

14. The Robinson-Patman Act prohibits companies from pricing products at different levels when there are no significant differences in production costs.

ANS: T DIF: Easy OBJ: 10-6

15. When making a decision to discontinue an operating segment, allocated common costs are not considered.

ANS: T DIF: Easy OBJ: 10-7

16. When making a decision to discontinue an operating segment, avoidable fixed costs are not considered.

ANS: F DIF: Easy OBJ: 10-7

17. Segment margin measures a segment's contribution to the coverage of indirect expenses.

ANS: T DIF: Moderate OBJ: 10-7

18. Depreciation on factory equipment is normally a relevant cost in product line decisions.

ANS: F DIF: Moderate OBJ: 10-7

19. Minimization of contribution margin is a common objective function in linear programming.

ANS: F DIF: Easy OBJ: 10-8

20. Minimization of variable costs is a common objective function in linear programming.

ANS: T DIF: Easy OBJ: 10-8

21. Maximization of variable costs is a common objective function in linear programming.

ANS: F DIF: Easy OBJ: 10-8

22. Maximization of contribution margin is a common objective function in linear programming.

ANS: T DIF: Easy OBJ: 10-8

23. In linear programming, resource constraints are usually expressed as inequalities.

ANS: T DIF: Moderate OBJ: 10-8

24. In linear programming, a slack variable represents the unused portion of a resource.

ANS: T DIF: Moderate OBJ: 10-8

25. In linear programming, a slack variable is associated with $\leq$ constraints.

    ANS: T DIF: Moderate OBJ: 10-8

26. In linear programming, a surplus variable is associated with $\geq$ constraints.

    ANS: T DIF: Moderate OBJ: 10-8

27. In linear programming, a surplus variable represents overachievement of minimum requirements.

    ANS: T DIF: Moderate OBJ: 10-8

28. In linear programming, a surplus variable represents the unused portion of a resource.

    ANS: F DIF: Moderate OBJ: 10-8

COMPLETION

1. The amount of revenue that differs across decision choices is referred to as _____.

   ANS: incremental revenue

   DIF: Easy OBJ: 10-1

2. The amount of cost that differs across decision choices is referred to as _____.

   ANS: incremental cost

   DIF: Easy OBJ: 10-1

3. The benefits foregone when one course of action is chosen over another are referred to as _____.

   ANS: opportunity costs

   DIF: Easy OBJ: 10-1

4. Costs incurred in the past to acquire an asset are referred to as _____.

   ANS: sunk costs

   DIF: Easy OBJ: 10-2

5. When a company has work performed by an external supplier, it is engaging in _____.

   ANS: outsourcing

   DIF: Easy OBJ: 10-3

6. The relative product quantities composing a company's total sales is referred to as a company's _____.

   ANS: sales mix

   DIF: Easy OBJ: 10-5

7. The excess of revenues over direct variable expenses and avoidable fixed expenses is referred to as _____.

   ANS: segment margin

   DIF: Easy OBJ: 10-7

8. In linear programming, a limiting factor that hampers management's pursuit of an objective is referred to as a _____.

   ANS: constraint

   DIF: Easy OBJ: 10-8

9. In linear programming, the equation that specifies management's objective is referred to as a(n) _____.

   ANS: objective function

   DIF: Easy OBJ: 10-8

10. In linear programming, a _____ represents the unused amount of a resource at any level of operation.

    ANS: slack variable

    DIF: Moderate OBJ: 10-8

11. In linear programming, a _____ represents the overachievement of a minimum requirement.

    ANS: surplus variable

    DIF: Moderate OBJ: 10-8

MULTIPLE CHOICE

1. Which of the following is **not** a characteristic of relevant costing information? It is
   a. associated with the decision under consideration.
   b. significant to the decision maker.
   c. readily quantifiable.
   d. related to a future endeavor.

   ANS: C DIF: Easy OBJ: 10-1

2. A fixed cost is relevant if it is
   a. a future cost.
   b. Avoidable.
   c. sunk.
   d. a product cost.

   ANS: B DIF: Easy OBJ: 10-1

3. Relevant costs are
   a. all fixed and variable costs.
   b. all costs that would be incurred within the relevant range of production.
   c. past costs that are expected to be different in the future.
   d. anticipated future costs that will differ among various alternatives.

   ANS: D DIF: Easy OBJ: 10-1

4. Which of the following is the **least** likely to be a relevant item in deciding whether to replace an old machine?
   a. acquisition cost of the old machine
   b. outlay to be made for the new machine
   c. annual savings to be enjoyed on the new machine
   d. life of the new machine

   ANS: A DIF: Easy OBJ: 10-2

5. If a cost is irrelevant to a decision, the cost could **not** be
   a. a sunk cost.
   b. a future cost.
   c. a variable cost.
   d. an incremental cost.

   ANS: D DIF: Easy OBJ: 10-2

6. Which of the following costs would be relevant in short-term decision making?
   a. incremental fixed costs
   b. all costs of inventory
   c. total variable costs that are the same in the considered alternatives
   d. the cost of a fixed asset that could be used in all the considered alternatives

   ANS: A DIF: Easy OBJ: 10-2

7. The term incremental cost refers to
   a. the profit foregone by selecting one choice instead of another.
   b. the additional cost of producing or selling another product or service.
   c. a cost that continues to be incurred in the absence of activity.
   d. a cost common to all choices in question and not clearly or feasibly allocable to any of them.

   ANS: B DIF: Easy OBJ: 10-2

8. A cost is sunk if it
   a. is not an incremental cost.
   b. is unavoidable.
   c. has already been incurred.
   d. is irrelevant to the decision at hand.

   ANS: C DIF: Easy OBJ: 10-2

9. Most_____ are relevant to decisions to acquire capacity, but not to short-run decisions involving the use of that capacity.
   a. sunk costs
   b. incremental costs
   c. fixed costs
   d. prime costs

   ANS: C DIF: Easy OBJ: 10-2

10. Irrelevant costs generally include

	Sunk costs	Historical costs	Allocated costs
a.	yes	yes	no
b.	yes	no	no
c.	no	no	yes
d.	yes	yes	yes

    ANS: D DIF: Easy OBJ: 10-2

11. In deciding whether an organization will keep an old machine or purchase a new machine, a manager would ignore the
    a. estimated disposal value of the old machine.
    b. acquisition cost of the old machine.
    c. operating costs of the new machine.
    d. estimated disposal value of the new machine.

    ANS: B DIF: Easy OBJ: 10-2

12. The potential rental value of space used for production activities
    a. is a variable cost of production.
    b. represents an opportunity cost of production.
    c. is an unavoidable cost.
    d. is a sunk cost of production.

    ANS: B DIF: Easy OBJ: 10-3

13. The opportunity cost of making a component part in a factory with excess capacity for which there is no alternative use is
    a. the total manufacturing cost of the component.
    b. the total variable cost of the component.
    c. the fixed manufacturing cost of the component.
    d. zero.

    ANS: D DIF: Easy OBJ: 10-3

14. Which of the following are relevant in a make or buy decision?

	Variable costs	Avoidable fixed costs	Unavoidable fixed costs
a.	no	yes	yes
b.	yes	no	yes
c.	no	no	yes
d.	yes	yes	no

ANS: D DIF: Easy OBJ: 10-3

15. In a make or buy decision, the opportunity cost of capacity could
    a. be considered to decrease the price of units purchased from suppliers.
    b. be considered to decrease the cost of units manufactured by the company.
    c. be considered to increase the price of units purchased from suppliers.
    d. not be considered since opportunity costs are not part of the accounting records.

ANS: A DIF: Easy OBJ: 10-3

16. Which of the following are relevant in a make or buy decision?

	Prime costs	Sunk costs	Incremental costs
a.	yes	yes	yes
b.	yes	no	yes
c.	yes	no	no
d.	no	no	yes

ANS: B DIF: Easy OBJ: 10-3

17. In a make or buy decision, the reliability of a potential supplier is
    a. an irrelevant decision factor.
    b. relevant information if it can be quantified.
    c. an opportunity cost of continued production.
    d. a qualitative decision factor.

ANS: D DIF: Easy OBJ: 10-3

18. Which of the following qualitative factors favors the buy choice in a make or buy decision for a part?
    a. maintaining a long-term relationship with suppliers
    b. quality control is critical
    c. utilization of idle capacity
    d. part is critical to product

ANS: A DIF: Easy OBJ: 10-3

19. When a scarce resource, such as space, exists in an organization, the criterion that should be used to determine production is
    a. contribution margin per unit.
    b. selling price per unit.
    c. contribution margin per unit of scarce resource.
    d. total variable costs of production.

ANS: C DIF: Easy OBJ: 10-4

20. Fixed costs are ignored in allocating scarce resources because
    a. they are sunk.
    b. they are unaffected by the allocation of scarce resources.
    c. there are no fixed costs associated with scarce resources.
    d. fixed costs only apply to long-run decisions.

    ANS: B DIF: Easy OBJ: 10-4

21. The minimum selling price that should be acceptable in a special order situation is equal to total
    a. production cost.
    b. variable production cost.
    c. variable costs.
    d. production cost plus a normal profit margin.

    ANS: C DIF: Easy OBJ: 10-6

22. Which of the following costs is **irrelevant** in making a decision about a special order price if some of the company facilities are currently idle?
    a. direct labor
    b. equipment depreciation
    c. variable cost of utilities
    d. opportunity cost of production

    ANS: B DIF: Easy OBJ: 10-6

23. The _____ prohibits companies from pricing products at different amounts unless these differences reflect differences in the cost to manufacture, sell, or distribute the products.
    a. Internal Revenue Service
    b. Governmental Accounting Office
    c. Sherman Antitrust Act
    d. Robinson-Patman Act

    ANS: D DIF: Easy OBJ: 10-6

24. An ad hoc sales discount is
    a. an allowance for an inferior quality of marketed goods.
    b. a discount that an ad hoc committee must decide on.
    c. brought about by competitive pressures.
    d. none of the above.

    ANS: C DIF: Moderate OBJ: 10-6

25. A manager is attempting to determine whether a segment of the business should be eliminated. The focus of attention for this decision should be on
    a. the net income shown on the segment's income statement.
    b. sales minus total expenses of the segment.
    c. sales minus total direct expenses of the segment.
    d. sales minus total variable expenses and avoidable fixed expenses of the segment.

    ANS: D DIF: Easy OBJ: 10-7

26. Assume a company produces three products: A, B, and C. It can only sell up to 3,000 units of each product. Production capacity is unlimited. The company should produce the product (or products) that has (have) the highest
    a. contribution margin per hour of machine time.
    b. gross margin per unit.
    c. contribution margin per unit.
    d. sales price per unit.

    ANS: C DIF: Easy OBJ: 10-7

27. For a particular product in high demand, a company decreases the sales price and increases the sales commission. These changes will **not** increase
    a. sales volume.
    b. total selling expenses for the product.
    c. the product contribution margin.
    d. the total variable cost per unit.

    ANS: C DIF: Easy OBJ: 10-7

28. An increase in direct fixed costs could reduce all of the following **except**
    a. product line contribution margin.
    b. product line segment margin.
    c. product line operating income.
    d. corporate net income.

    ANS: A DIF: Easy OBJ: 10-7

29. When a company discontinues a segment, total corporate costs may decrease in all of the following categories **except**
    a. variable production costs.
    b. allocated common costs.
    c. direct fixed costs.
    d. variable period costs.

    ANS: B DIF: Easy OBJ: 10-7

30. In evaluating the profitability of a specific organizational segment, all _____ would be ignored.
    a. segment variable costs
    b. segment fixed costs
    c. costs allocated to the segment
    d. period costs

    ANS: C DIF: Easy OBJ: 10-7

31. Knox Company uses 10,000 units of a part in its production process. The costs to make a part are: direct material, $12; direct labor, $25; variable overhead, $13; and applied fixed overhead, $30. Knox has received a quote of $55 from a potential supplier for this part. If Knox buys the part, 70 percent of the applied fixed overhead would continue. Knox Company would be better off by
    a. $50,000 to manufacture the part.
    b. $150,000 to buy the part.
    c. $40,000 to buy the part.
    d. $160,000 to manufacture the part.

    ANS: C

Cost to make: $55/unit * 10,000 units = $550,000 Cost to manufacture: $(12+25+13+9)= $59/unit Incremental difference in favor of buying: $4/unit * 10,000 units = **$40,000**

    DIF: Moderate OBJ: 10-3

32. Paulson Company has only 25,000 hours of machine time each month to manufacture its two products. Product X has a contribution margin of $50, and Product Y has a contribution margin of $64. Product X requires 5 hours of machine time, and Product Y requires 8 hours of machine time. If Paulson Company wants to dedicate 80 percent of its machine time to the product that will provide the most income, the company will have a total contribution margin of
    a. $250,000.
    b. $240,000.
    c. $210,000.
    d. $200,000.

    ANS: B

Assume 80% of capacity applied to Product X

X: 20,000 hrs/5 hrs per unit	4,000 units * $50 CM/unit	$200,000
Y: 5,000 hrs/8 hrs per unit	625 units * $64 CM/unit	40,000
	Total	**$240,000** ======

    DIF: Difficult OBJ: 10-7

33. Doyle Company has 3 divisions: R, S, and T. Division R's income statement shows the following for the year ended December 31:

Sales		$1,000,000
Cost of goods sold		(800,000)
Gross profit		$ 200,000
Selling expenses	$100,000	
Administrative expenses	250,000	(350,000)
Net loss		$ (150,000)

Cost of goods sold is 75 percent variable and 25 percent fixed. Of the fixed costs, 60 percent are avoidable if the division is closed. All of the selling expenses relate to the division and would be eliminated if Division R were eliminated. Of the administrative expenses, 90 percent are applied from corporate costs. If Division R were eliminated, Doyle's income would

a. increase by $150,000.
b. decrease by $ 75,000.
c. decrease by $155,000.
d. decrease by $215,000.

ANS: C

Sales foregone		$(1,000,000)
COGS avoided		
Variable	$600,000	
Fixed	120,000	720,000
Selling Expense Avoided		100,000
Administrative Expense Avoided		25,000
Decrease in income		**$(155,000)**
		=========

DIF: Moderate OBJ: 10-7

34. Thomas Company is currently operating at a loss of $15,000. The sales manager has received a special order for 5,000 units of product, which normally sells for $35 per unit. Costs associated with the product are: direct material, $6; direct labor, $10; variable overhead, $3; applied fixed overhead, $4; and variable selling expenses, $2. The special order would allow the use of a slightly lower grade of direct material, thereby lowering the price per unit by $1.50 and selling expenses would be decreased by $1. If Thomas wants this special order to increase the total net income for the firm to $10,000, what sales price must be quoted for each of the 5,000 units?
a. $23.50
b. $24.50
c. $27.50
d. $34.00

ANS: A
In order to increase income to $10,000, there must be an increase of $25,000 or $5 per unit.

Direct materials	$ 4.50
Direct Labor	10.00
Variable Overhead	3.00
Variable Selling Exp	1.00
Production Costs	$18.50
Additional profit per unit	5.00
Sales price/unit	**$23.50**

DIF: Moderate OBJ: 10-6

35. Quest Company produces a part that has the following costs per unit:

Direct material	$ 8
Direct labor	3
Variable overhead	1
Fixed overhead	5
Total	$17

Zest Corporation can provide the part to Quest for $19 per unit. Quest Company has determined that 60 percent of its fixed overhead would continue if it purchased the part. However, if Quest no longer produces the part, it can rent that portion of the plant facilities for $60,000 per year. Quest Company currently produces 10,000 parts per year. Which alternative is preferable and by what margin?
a. Make-$20,000
b. Make-$50,000
c. Buy-$10,000
d. Buy-$40,000

ANS: C

Purchase price from Zest	$(190,000)
Rent Revenue Received	60,000
Variable Costs Avoided	120,000
Fixed Overhead Avoided	20,000
Difference in Favor of Buying	**$ 10,000**

DIF: Moderate OBJ: 10-3

36. Browning Company has 15,000 units in inventory that had a production cost of $3 per unit. These units cannot be sold through normal channels due to a significant technology change. These units could be reworked at a total cost of $23,000 and sold for $28,000. Another alternative is to sell the units to a junk dealer for $8,500. The relevant cost for Browning to consider in making its decision is
    a. $45,000 of original product costs.
    b. $23,000 for reworking the units.
    c. $68,000 for reworking the units.
    d. $28,000 for selling the units to the junk dealer.

    ANS: B

    Only the actual reworking costs are relevant. Original purchase costs are irrelevant.

    DIF: Easy OBJ: 10-3

Robertson Corporation

Robertson Corporation sells a product for $18 per unit, and the standard cost card for the product shows the following costs:

Direct material	$ 1
Direct labor	2
Overhead (80% fixed)	7
Total	$10

37. Refer to Robertson Corporation. Robertson received a special order for 1,000 units of the product. The only additional cost to Robertson would be foreign import taxes of $1 per unit. If Robertson is able to sell all of the current production domestically, what would be the minimum sales price that Robertson would consider for this special order?
    a. $18.00
    b. $11.00
    c. $5.40
    d. $19.00

    ANS: D

    The company would increase its minimum sales price to reflect the foreign import tax of $1 per unit.

    DIF: Easy OBJ: 10-6

38. Refer to Robertson Corporation. Assume that Robertson has sufficient idle capacity to produce the 1,000 units. If Robertson wants to increase its operating profit by $5,600, what would it charge as a per-unit selling price?
    a. $18.00
    b. $10.00
    c. $11.00
    d. $16.60

    ANS: C

    The company would want to charge a price equal to a per unit profit of $5.60 plus variable costs per unit of $4.40 and the import tax per unit of $1.00. The total price is **$11.00.**

    DIF: Moderate OBJ: 10-3

39. Glamorous Grooming Corporation makes and sells brushes and combs. It can sell all of either product it can make. The following data are pertinent to each respective product:

	Brushes	Combs
Units of output per machine hour	8	20
Selling price per unit	$12.00	$4.00
Product cost per unit		
Direct material	$1.00	$1.20
Direct labor	2.00	0.10
Variable overhead	0.50	0.05

Total fixed overhead is $380,000.

The company has 40,000 machine hours available for production. What sales mix will maximize profits?

a. 320,000 brushes and 0 combs
b. 0 brushes and 800,000 combs
c. 160,000 brushes and 600,000 combs
d. 252,630 brushes and 252,630 combs

ANS: A

Brushes have a contribution margin of $8.50 per unit; combs have a contribution margin of $2.65 per unit.

The combination of 320,000 brushes and 0 combs provides a net profit of $340,000.

DIF: Easy OBJ: 10-5

40. Houston Footwear Corporation has been asked to submit a bid on supplying 1,000 pairs of military combat boots to the Armed Forces. The company's costs per pair of boots are as follows:

Direct material	$8
Direct labor	6
Variable overhead	3
Variable selling cost (commission)	3
Fixed overhead (allocated)	2
Fixed selling and administrative cost	1

Assuming that there would be no commission on this potential sale, the lowest price the firm can bid is some price greater than

a. $23.
b. $20.
c. $17.
d. $14.

ANS: C

The lowest price would have to be greater than the sum of all variable manufacturing costs. Variable manufacturing costs total $17; therefore the price would have to be greater than $17 per pair.

DIF: Easy OBJ: 10-5

41. Holt Industries has two sales territories-East and West. Financial information for the two territories is presented below:

	East	West
Sales	$980,000	$750,000
Direct costs:		
Variable	(343,000)	(225,000)
Fixed	(450,000)	(325,000)
Allocated common costs	(275,000)	(175,000)
Net income (loss)	$(88,000)	$ 25,000

Because the company is in a start-up stage, corporate management feels that the East sales territory is creating too much of a cash drain on the company and it should be eliminated. If the East territory is discontinued, one sales manager (whose salary is $40,000 per year) will be relocated to the West territory. By how much would Holt's income change if the East territory is eliminated?

a. increase by $88,000
b. increase by $48,000
c. decrease by $267,000
d. decrease by $227,000

ANS: D

Sales foregone in East	$(980,000)
Variable costs avoided	343,000
Fixed costs avoided	410,000
Decrease in income from eliminating East territory	**$(227,000)** ========

DIF: Moderate OBJ: 10-7

Woodville Motors

Woodville Motors is trying to decide whether it should keep its existing car washing machine or purchase a new one that has technological advantages (which translate into cost savings) over the existing machine. Information on each machine follows:

	Old machine	New machine
Original cost	$9,000	$20,000
Accumulated depreciation	5,000	0
Annual cash operating costs	9,000	4,000
Current salvage value of old machine	2,000	
Salvage value in 10 years	500	1,000
Remaining life	10 yrs.	10 yrs.

42. Refer to Woodville Motors. The $4,000 of annual operating costs that are common to both the old and the new machine are an example of a(n)

a. sunk cost.
b. irrelevant cost.
c. future avoidable cost.
d. opportunity cost.

ANS: B DIF: Easy OBJ: 10-1

43. Refer to Woodville Motors. The $9,000 cost of the original machine represents a(n)
    a. sunk cost.
    b. future relevant cost.
    c. historical relevant cost.
    d. opportunity cost.

    ANS: A DIF: Easy OBJ: 10-2

44. Refer to Woodville Motors. The $20,000 cost of the new machine represents a(n)
    a. sunk cost.
    b. future relevant cost.
    c. future irrelevant cost.
    d. opportunity cost.

    ANS: B DIF: Easy OBJ: 10-3

45. Refer to Woodville Motors. The estimated $500 salvage value of the existing machine in 10 years represents a(n)
    a. sunk cost.
    b. opportunity cost of selling the existing machine now.
    c. opportunity cost of keeping the existing machine for 10 years.
    d. opportunity cost of keeping the existing machine and buying the new machine.

    ANS: B DIF: Easy OBJ: 10-3

46. Refer to Woodville Motors. The incremental cost to purchase the new machine is
    a. $11,000.
    b. $20,000.
    c. $13,000.
    d. $18,000.

    ANS: D

    Incremental cost = Purchase price of new machine - Current salvage value
    Incremental cost = $(20,000 - 2,000)
    Incremental cost = $18,000

    DIF: Easy OBJ: 10-3

Entertainment Solutions Corporation

Entertainment Solutions Corporation manufactures and sells FM radios. Information on the prior year's operations (sales and production Model A1) is presented below:

Sales price per unit	$30
Costs per unit:	
Direct material	7
Direct labor	4
Overhead (50% variable)	6
Selling costs (40% variable)	10
Production in units	10,000
Sales in units	9,500

47. Refer to Entertainment Solutions Corporation**.** The Model B2 radio is currently in production and it renders the Model A1 radio obsolete. If the remaining 500 units of the Model A1 radio are to be sold through regular channels, what is the minimum price the company would accept for the radios?
    a. $30
    b. $27
    c. $18
    d. $4

    ANS: D
    $4 would cover the variable selling expenses.

    DIF: Moderate OBJ: 10-5

48. Refer to Entertainment Solutions Corporation. Assume that the remaining Model A1 radios can be sold through normal channels or to a foreign buyer for $6 per unit. If sold through regular channels, the minimum acceptable price will be
    a. $30.
    b. $33.
    c. $10.
    d. $4.

    ANS: C
    $10 will cover the price to the foreign buyer plus the $4 in variable selling expenses.

    DIF: Moderate OBJ: 10-5

Chip Division of Computer Solutions, Inc.

The Chip Division of Computer Solutions, Inc. produces a high-quality computer chip. Unit production costs (based on capacity production of 100,000 units per year) follow:

Direct material	$50
Direct labor	20
Overhead (20% variable)	10
Other information:	
Sales price	100
SG&A costs (40% variable)	15

49. Refer to Chip Division of Computer Solutions, Inc. Assume, for this question only, that the Chip Division is producing and selling at capacity. What is the minimum selling price that the division would consider on a "special order" of 1,000 chips on which no variable period costs would be incurred?
    a. $100
    b. $72
    c. $81
    d. $94

    ANS: D

    Variable period costs are $6 ($15 * 40% variable)
    The minimum selling price would have to be greater than the manufacturing costs and fixed period costs.
    $(100 - 6) = **$94 per unit**

    DIF: Moderate OBJ: 10-6

50. Refer to Chip Division of Computer Solutions, Inc. Assume, for this question only, that the Chip Division is operating at a level of 70,000 chips per year. What is the minimum price that the division would consider on a "special order" of 1,000 chips to be distributed through normal channels?
    a. $78
    b. $95
    c. $100
    d. $81

    ANS: A

    The price would have to cover all variable costs.
    $(50 + 20 + 2 + 6) = **$78 per unit**

    DIF: Moderate OBJ: 10-6

51. Refer to Chip Division of Computer Solutions, Inc. Assume, for this question only, that the Chip Division is presently operating at a level of 80,000 chips per year. Accepting a "special order" on 2,000 chips at $88 will
    a. increase total corporate profits by $4,000.
    b. increase total corporate profits by $20,000.
    c. decrease total corporate profits by $14,000.
    d. decrease total corporate profits by $24,000.

    ANS: B

    $(88 - 78) = $10 profit per unit * 2,000 units = **$20,000 profit increase**

    DIF: Moderate OBJ: 10-6

Richmond Steel Corporation

The capital budgeting committee of the Richmond Steel Corporation is evaluating the possibility of replacing its old pipe-bending machine with a more advanced model. Information on the existing machine and the new model follows:

	Existing machine	New machine
Original cost	$200,000	$400,000
Market value now	80,000	
Market value in year 5	0	20,000
Annual cash operating costs	40,000	10,000
Remaining life	5 yrs.	5 yrs.

52. Refer to Richmond Steel Corporation. The major opportunity cost associated with the continued use of the existing machine is
    a. $30,000 of annual savings in operating costs.
    b. $20,000 of salvage in 5 years on the new machine.
    c. lost sales resulting from the inefficient existing machine.
    d. $400,000 cost of the new machine.

    ANS: A DIF: Easy OBJ: 10-1

53. Refer to Richmond Steel Corporation. The $80,000 market value of the existing machine is
    a. a sunk cost.
    b. an opportunity cost of keeping the old machine.
    c. irrelevant to the equipment replacement decision.
    d. a historical cost.

    ANS: B DIF: Easy OBJ: 10-1

54. Refer to Richmond Steel Corporation. If the company buys the new machine and disposes of the existing machine, corporate profit over the five-year life of the new machine will be _____ than the profit that would have been generated had the existing machine been retained for five years.
    a. $150,000 lower
    b. $170,000 lower
    c. $230,000 lower
    d. $150,000 higher

    ANS: A

Annual savings in operating costs	$ 150,000
Purchase of new machine	(400,000)
Disposal of existing machine	80,000
Disposal of new machine in 5 years	20,000
Difference in profit	**$(150,000)**

    DIF: Moderate OBJ: 10-1

55. Emerald Corporation has been manufacturing 5,000 units of Part 10541, which is used in the manufacture of one of its products. At this level of production, the cost per unit of manufacturing Part 10541 is as follows:

Direct material	$ 2
Direct labor	8
Variable overhead	4
Fixed overhead applied	6
Total	$20

Hamilton Company has offered to sell Emerald 5,000 units of Part 10541 for $19 a unit. Emerald has determined that it could use the facilities currently used to manufacture Part 10541 to manufacture Part RAC and generate an operating profit of $4,000. Emerald has also determined that two-thirds of the fixed overhead applied will continue even if Part 10541 is purchased from Hamilton. To determine whether to accept Hamilton's offer, the net relevant costs to make are

a. $70,000.
b. $84,000.
c. $90,000.
d. $95,000.

ANS: B

The relevant costs are the variable costs per unit as well as the portion of fixed overhead that will be avoided for Part 10541.
Variable costs = $14 per unit
Fixed overhead = $ 2 per unit
5,000 units * $16 per unit = $80,000 + Profit from RAC = $ 4,000
Total Relevant Costs $84,000

DIF: Moderate OBJ: 10-3

56. Harding Corporation manufactures batons. Harding can manufacture 300,000 batons a year at a variable cost of $750,000 and a fixed cost of $450,000. Based on Harding's predictions, 240,000 batons will be sold at the regular price of $5.00 each. In addition, a special order was placed for 60,000 batons to be sold at a 40 percent discount off the regular price. The unit relevant cost per unit for Harding's decision is

a. $1.50.
b. $2.50.
c. $3.00.
d. $4.00.

ANS: B

The relevant costs will be the variable costs per unit.
$750,000/300,000 units = $2.50/unit

DIF: Moderate OBJ: 10-6

57. The objective in solving the linear programming problem is to determine the optimal levels of the

a. coefficients.
b. dependent variables.
c. independent variables.
d. slack variables.

ANS: C DIF: Easy OBJ: 10-8

58. A linear programming problem can have
    a. no more than three resource constraints.
    b. only one objective function.
    c. no more than two dependent variables for each constraint equation.
    d. no more than three independent variables.

    ANS: B DIF: Easy OBJ: 10-8

59. A linear programming model must
    a. have only one objective function.
    b. have as many independent variables as it has constraint equations.
    c. have at least two dependent variables for each equation.
    d. consider only the constraints that can be expressed as inequalities.

    ANS: A DIF: Easy OBJ: 10-8

60. In a linear programming problem, constraints are indicated by
    a. the independent variables.
    b. the dependent variables in the constraint equations.
    c. the coefficients of the objective function.
    d. iso-cost lines.

    ANS: B DIF: Easy OBJ: 10-8

61. The feasible region for an LP solution is
    a. defined only by binding constraints on the optimal solution.
    b. defined as the solution space that satisfies all constraints.
    c. identified by iso-cost and iso-profit lines.
    d. identified by all of the above.

    ANS: B DIF: Easy OBJ: 10-8

62. A linear programming solution
    a. always involves more than one constraint.
    b. always involves a corner point.
    c. is the one with the highest vertex coordinates.
    d. is provided by the input-output coefficients.

    ANS: B DIF: Easy OBJ: 10-8

63. The objective function and the resource constraints have the same
    a. dependent variables.
    b. coefficients.
    c. independent variables.
    d. all of the above.

    ANS: C DIF: Easy OBJ: 10-8

64. Which of the following items continuously checks for an improved solution from the one previously computed?

	An algorithm	Simplex method
a.	yes	yes
b.	yes	no
c.	no	no
d.	no	yes

ANS: A DIF: Easy OBJ: 10-8

65. Which of the following variables is associated with the "less than or equal to" constraints?

	Surplus	Slack
a.	yes	yes
b.	yes	no
c.	no	yes
d.	no	no

ANS: C DIF: Easy OBJ: 10-8

66. _____ programming relates to a variety of techniques that are used to allocate limited resources among activities to achieve a specific objective.
a. Integer
b. Input-output
c. Mathematical
d. Regression

ANS: C DIF: Easy OBJ: 10-8

67. The graphical approach to solving a linear programming problem becomes much more complex when there are more than two

	constraints	decision variables
a.	yes	no
b.	no	yes
c.	yes	yes
d.	no	no

ANS: C DIF: Easy OBJ: 10-8

68. The feasible region for a graphical solution to a profit maximization problem includes
a. all vertex points.
b. all points on every resource constraint line.
c. the origin.
d. all of the above.

ANS: C DIF: Easy OBJ: 10-8

Uncommon Products Corporation

In the two following constraint equations, X and Y represent two products (in units) produced by the Uncommon Products Corporation.

Constraint 1: $3X + 5Y \leq 4{,}200$
Constraint 2: $5X + 2Y \geq 3{,}000$

69. Refer to Uncommon Products Corporation. What is the maximum number of units of Product X that can be produced?
    a. 4,200
    b. 3,000
    c. 600
    d. 1,400

    ANS: D
    1,400 units is the only amount that will not cause Constraint 1 to be violated.

    DIF: Moderate OBJ: 10-8

70. Refer to Uncommon Products Corporation. What is the feasible range for the production of Y?
    a. 840 to 1,500 units
    b. 0 to 840 units
    c. 0 to 631 units
    d. 0 to 1500 units

    ANS: B
    840 units is the most that can be produced without violating Constraint 1.

    DIF: Moderate OBJ: 10-8

71. Refer to Uncommon Products Corporation. A solution of X = 500 and Y = 600 would violate
    a. Constraint 1.
    b. Constraint 2.
    c. both constraints.
    d. neither constraint.

    ANS: A
    This solution would yield a result of 4,500; this violates Constraint 1.

    DIF: Easy OBJ: 10-8

72. One constraint in an LP problem is: $12X + 7Y \geq 4{,}000$. If the optimal solution is X = 100 and Y = 500, this resource has
    a. slack variable of 700.
    b. surplus variable of 700.
    c. output coefficient of 700.
    d. none of the above.

    ANS: B
    The solution to the constraint is 4,700, a surplus variable of 700.

    DIF: Easy OBJ: 10-8

73. Consider the following linear programming problem and assume that non-negativity constraints apply to the independent variables:

Max CM = $14X + $23Y
Subject to
Constraint 1: 4X + 5Y < 3,200
Constraint 2: 2X + 6Y ≤ 2,400

Which of the following are feasible solutions to the linear programming problem?
a. X = 600, Y = 240
b. X = 800, Y = 640
c. X = 0, Y = 400
d. X = 1,200, Y = 0

ANS: C

This is the only solution that does not violate Constraints 1 or 2.
Constraint 1: 4(0) + 5(400) = 2,000 < 3,200
Constraint 2: 2(0) + 6(400) ≤ 2,400 ≤ 2,400

DIF: Moderate OBJ: 10-8

74. Contracting with vendors outside the organization to obtain or acquire goods and/or services is called
a. target costing.
b. insourcing.
c. outsourcing.
d. product harvesting.

ANS: C DIF: Easy OBJ: 10-3

75. Which of the following activities within an organization would be **least likely** to be outsourced?
a. accounting
b. data processing
c. transportation
d. product design

ANS: D DIF: Easy OBJ: 10-3

76. An outside firm selected to provide services to an organization is called a
a. contract vendor.
b. lessee.
c. network organization.
d. centralized insourcer.

ANS: A DIF: Easy OBJ: 10-3

77. Costs forgone when an individual or organization chooses one option over another are
a. budgeted costs.
b. sunk costs.
c. historical costs.
d. opportunity costs.

ANS: D DIF: Easy OBJ: 10-1

78. Which of the following costs would **not** be accounted for in a company's recordkeeping system?
    a. an unexpired cost
    b. an expired cost
    c. a product cost
    d. an opportunity cost

    ANS: D DIF: Easy OBJ: 10-1

SHORT ANSWER

1. What are three characteristics of relevant information?

   ANS:
   Relevant information must be: (1) associated with the decision under consideration; (2) be important to the decision maker; and (3) have a connection to or bearing on some future endeavor.

   DIF: Easy OBJ: 10-1

2. Why is depreciation expense irrelevant to most managerial decisions, even when it is a future cost?

   ANS:
   Depreciation expense is simply the systematic write-off of a sunk cost (the cost of a long-lived asset). Depreciation expense is therefore always irrelevant unless it pertains to an asset that is not yet acquired.

   DIF: Moderate OBJ: 10-2

3. What is an opportunity cost and why is it a relevant cost?

   ANS:
   An opportunity cost is not a "cost" in the traditional out-of-pocket sense. Opportunity costs are benefits that are sacrificed to pursue one alternative rather than another. Once an alternative is selected, the opportunity costs associated with that alternative will not appear directly in the accounting records of the firm as other costs of that alternative will. These costs are, however, relevant because the company is giving up one set of benefits to accept a second set. Rational decision making assumes that the chosen alternative provides the greater benefit.

   DIF: Moderate OBJ: 10-1

4. Define segment margin and explain why it is a relevant measure of a segment's contribution to overall organizational profitability.

   ANS:
   Segment margin is the amount of income that remains after deducting all avoidable (both variable and fixed) costs from sales. This measure is the appropriate gauge of a segment's viability because it is a direct measure of how total organizational profits would change if the segment was discontinued.

   DIF: Moderate OBJ: 10-7

5. What is the relationship between scarce resources and an organization's production capacity?

   ANS:
   In the long run, capacity is likely to be constrained by two fundamental resources: labor and machinery. However, in the short run, additional constraints can push capacity to levels below labor and machine capacity. Constraints can be induced by raw material shortages, interruptions in distribution channels, labor strikes in the plants of suppliers of important components, or governmental restrictions on markets (gas rationing, Quotas).

   DIF: Moderate OBJ: 10-4

6. Under what circumstances is the sum of variable production and selling costs the appropriate minimum price for special orders?

   ANS:
   Variable costs would serve as the bottom price for a special order only if the special order could be produced on production capacity that would otherwise be idle. Whenever presently employed capacity is partially or wholly surrendered to produce a special order, the special order price would be based on both variable costs and the profit sacrificed on the best alternative use of the capacity.

   DIF: Moderate OBJ: 10-6

7. Why are fixed costs generally more relevant in long-run decisions than short-run decisions?

   ANS:
   In the long run, all costs are relevant. In the short run, many costs that apply to the existing production technology are sunk. In particular, depreciation charges and lease payments on long-term assets are unavoidable. In the long run, these assets are replaced and, thus their associated costs are relevant in the replacement decision.

   DIF: Moderate OBJ: 10-2

8. Define and discuss outsourcing.

   ANS:
   Outsourcing occurs when an organization "farms out" some of its normal business activities or processes. Several areas that are most frequently outsourced by an organization include payroll, accounting, transportation, and possibly legal. When a company outsources some of its functions, it is able to divert more energy to those areas that produce a firm's core competencies or have the ability to create revenues for the firm.

   DIF: Moderate OBJ: 10-3

9. What are some factors that a company must consider when deciding to raise or lower sales prices on products?

   ANS:
   Quantitative factors include the new contribution margin per unit of the product, short-term and long-term changes in demand and production volume because of the price change, and the best use of a company's scarce resources.
   Qualitative factors include the impact of changes on customer goodwill toward the company, customer loyalty toward company products, and competitors' responses to the firm's new pricing structure.

   DIF: Moderate OBJ: 10-5

PROBLEM

Agri-Magic Corporation

Agri-Magic Corporation grows corn in rural areas of the South. Agri-Magic's costs per bushel of corn (based on an average yield of 130 bushels per acre) follow:

Direct material	$1.10
Direct labor	0.40
Variable overhead	0.30
Fixed overhead	0.60
Variable selling costs	0.10
Fixed selling costs	0

Agri-Magic defines direct material costs as seed, fertilizer, water, and other chemicals. The variable overhead costs represent maintenance and repair costs of machinery. The fixed overhead costs are completely comprised of depreciation expense on machinery and real estate taxes.

1. Refer to Agri-Magic Corporation. Assume that the current date is March 15. On this date, Agri-Magic must make a decision as to whether it is financially better off to plant a certain farm with corn or leave the land idle (no income is derived from idle land). Corn prices have been severely depressed in recent years and Agri-Magic's best guess is that corn prices will be around $2.00 per bushel at the time the crop is ready for harvest. Should the company plant corn or leave the land idle? Explain.

   ANS:
   The company should make their decision by comparing the incremental income from planting the corn crop to the incremental expenses that would be incurred to grow, harvest, and market the crop. The incremental revenue is simply the $2.00 per bushel and the incremental costs are all variable costs ($1.10 + $0.40 + $0.30 + $0.10 = $1.90). Based on this comparison, the company would be $13 per acre better off to plant than to let the land remain idle.

   DIF: Moderate OBJ: 10-3

2. Refer to Agri-Magic Corporation. Assume for this question only that the company decided to plant the corn. A local oil refiner has approached the company about converting the crop to grain alcohol (used to make gasohol) rather than selling the grain to the local grain elevator. If Agri-Magic converts the grain to alcohol, it will incur additional costs of $0.60 per bushel, and the company will be able to sell the crop to the oil refiner for the equivalent of $2.50 per bushel. Otherwise, the company can sell the corn crop to the local grain elevator for $1.85 per bushel. If Agri-Magic elects to sell the grain to the refinery, the company will not incur the variable selling costs. What should the company do? Support your answer with calculations.

   ANS:
   The company's alternatives are to sell the corn as a grain or as alcohol. This decision can be made by comparing the incremental costs to convert the grain to alcohol to the increase in price he can receive for marketing the crop as alcohol rather than grain. By converting the crop to alcohol, the company increases total revenue by $0.75 per bushel ($2.60 - $1.85) and it incurs additional costs of $0.50 ($0.60 for the additional processing, less the $0.10 savings on the variable grain marketing costs). Thus, by converting the grain to alcohol, the company could increase net income by $0.25 per bushel.

   DIF: Moderate OBJ: 10-5

3. Refer to Agri-Magic Corporation. Assume that the current date is March 15. On this date, Agri-Magic Corporation must make a decision as to whether it is financially better off to plant a certain farm to corn, leave the land idle (no income is derived from idle land), or rent the land to another farmer for $50 per acre. Corn prices have been severely depressed in recent years and Agri-Magic Corporation's best guess is that corn prices will be around $2.00 per bushel at the time the crop is ready for harvest. What should the company do? Show calculations.

   ANS:
   It has already been determined (answer to Problem #1) that planting corn is preferred to leaving the land idle (by $13 per acre). By renting the land, Agri-Magic Corporation is even better off. Under the rental alternative, Agri-Magic Corporation is $37 per acre better off than if he plants corn ($50 - $13). By renting the land, the company avoids all costs except the fixed production costs ($0.60 per bushel or $78 per acre).

   DIF: Moderate OBJ: 10-5

4. New Iberia Corporation makes and sells the "Tabasco Maiden", a wall hanging depicting a magical pepper plant. The Tabasco Maidens are sold at specialty shops for $50 each. The capacity of the plant is 15,000 Maidens per year. Costs to manufacture and sell each wall hanging are as follows:

Direct material	$ 5.00
Direct labor	6.00
Variable overhead	8.00
Fixed overhead	10.00
Variable selling expenses	2.50

   New Iberia Corporation has been approached by an Texas company about purchasing 2,500 Tabasco Maidens. The company is currently making and selling 15,000 per year. The Texas company wants to attach its own Lone Star label, which increases costs by $.50 each. No selling expenses would be incurred on this order. The corporation believes that it must make an additional $1 on each Tabasco Maiden to accept this offer.

   a. What is the opportunity cost per unit of selling to the Texas company?
   b. What is the minimum selling price that should be set?

ANS:

a. Opportunity cost = Selling price minus total variable costs \$50 - (\$5 + \$6 + \$8 + \$2.50) = \$28.50

b.

Direct material (\$5.00 + \$.50)	\$ 5.50
Direct labor	6.00
Variable overhead	8.00
Fixed overhead	10.00
Variable selling	0
Opportunity cost [from (a) less fixed overhead included]	18.50
Extra amount required to accept offer	1.00
Minimum price	\$49.00

DIF: Moderate OBJ: 10-1

5. Mighty Mike's Accounting Service provides two types of services: audit and tax. All company personnel can perform either service. In efforts to market its services, Mighty Mike relies on radio and billboards for advertising. Information on Mighty Mike's projected operations for the coming year follows:

	Audit	Taxes
Revenue per billable hour	\$35	\$30
Variable cost of professional labor	25	20
Material cost per billable hour	2	3
Allocated fixed costs per year	100,000	200,000
Projected billable hours	14,000	10,000

a. What is Mighty Mike's projected profit or (loss)?
b. If \$1 spent on advertising could increase either audit services billable time by 1 hour or tax services billable time by 1 hour, on which service should the advertising dollar be spent?

ANS:

a.

	Audit	Tax	Total
Revenue:			
14,000 × \$35	\$490,000		\$ 490,000
10,000 × \$30		\$ 300,000	300,000
Variable Costs:			
Labor:			
14,000 × \$25	(350,000)		(350,000)
10,000 × \$20		(200,000)	(200,000)
Material:			
14,000 × \$2	(28,000)		(28,000)
10,000 × \$3		(30,000)	(30,000)
Contribution margin	\$112,000	\$ 70,000	\$ 182,000
Fixed costs	(100,000)	(200,000)	(300,000)
Profit (loss)	\$ 12,000	\$(130,000)	\$(118,000)

b. Each billable hour of audit services generates $8 of contribution margin ($35 - $25 - $2), tax services generates $7 of contribution margin ($30 - $20 - $3). The advertising should be spent on the audit services.

DIF: Moderate OBJ: 10-5,10-7

6. The management of Whalen Industries has been evaluating whether the company should continue manufacturing a component or buy it from an outside supplier. A $100 cost per component was determined as follows:

Direct material	$ 15
Direct labor	40
Variable manufacturing overhead	10
Fixed manufacturing overhead	35
	$100

Whalen Industries uses 4,000 components per year. After Wilfert Corporation submitted a bid of $80 per component, some members of management felt they could reduce costs by buying from outside and discontinuing production of the component. If the component is obtained from Wilfert Corporation, Whalen Industries' unused production facilities could be leased to another company for $50,000 per year.

Required:

a. Determine the maximum amount per unit Whalen Industries could pay an outside supplier.

b. Indicate if the company should make or buy the component and the total dollar difference in favor of that alternative.

c. Assume the company could eliminate one production supervisor with a salary of $30,000 if the component is purchased from an outside supplier. Indicate if the company should make or buy the component and the total dollar difference in favor of that alternative.

ANS:

a. Cost to make = incremental manufacturing cost and opportunity cost
= DM + DL + V - FOH + OP COST
$77.50 = $15 + $40 + $10 + ($50,000/4,000 units)

b. Make: Save ($80.00 - $77.50) × 4,000 = $10,000

c.

Incremental mfg. = $65 + ($30,000/4,000) =		$72.50
+ opportunity cost $50,000/4,000	=	12.50
To make		$85.00

Buy: Save ($85 - $80) × 4,000 units = $20,000

DIF: Moderate OBJ: 10-3

7. Baxter Corporation is working at full production capacity producing 10,000 units of a unique product, JKL. Manufacturing costs per unit for JKL follow:

Direct material	$ 2
Direct manufacturing labor	3
Manufacturing overhead	5
	$10

The unit manufacturing overhead cost is based on a variable cost per unit of $2 and fixed costs of $30,000 (at full capacity of 10,000 units). The non-manufacturing costs, all variable, are $4 per unit, and the selling price is $20 per unit. A customer, Jacksonville Company, has asked Baxter to produce 2,000 units of a modification of JKL to be called RST. RST would require the same manufacturing processes as JKL. Jacksonville Company has offered to share equally the non-manufacturing costs with Baxter. RST will sell at $15 per unit.

Required:

a. What is the opportunity cost to Baxter of producing the 2,000 units of RST (assume that no overtime is worked)?

b. The Graves Company has offered to produce 2,000 units of JKL for Brown, so Brown can accept the Jacksonville offer. Graves Company would charge Baxter $14 per unit for the JKL. Should Baxter accept the Graves Company offer?

c. Suppose Baxter had been working at less than full capacity producing 8,000 units of JKL at the time the RST offer was made. What is the minimum price Baxter should accept for RST under these conditions (ignoring the $15 price mentioned previously)?

ANS:

a.

JKL			
SP	$20		
- VC	(11)	($2 + $3 + $2 + $4)	
= CM	$ 9	× 2,000 units =	$18,000
RST			
SP	$15		
- VC	(9)	($2 + $3 + $2 + $2)	
= CM	$ 6	x 2,000 units =	12,000
		Opportunity cost	$ 6,000

b. Make ($15 - $14) = $1 × 2,000 units = $2,000 without giving up any current production = DO IT.

c. The variable cost to make and sell = $11 ($2 + $3 + $2 + $4) would be the minimum. Any price over $11 would increase the contribution margin.

DIF: Moderate OBJ: 10-3

8. The Samuels Company normally produces 150,000 units of Product LM per year. Due to an economic downturn, the company has some idle capacity. Product LM sells for $15 per unit.

The firm's production, marketing, and administration costs at its normal capacity are:

	Per Unit
Direct material	$1.00
Direct labor	2.00
Variable overhead	1.50
Fixed overhead	
($450,000/150,000 units)	3.00
Variable marketing costs	1.05
Fixed marketing and administrative costs	
($210,000/150,000 units)	1.40
Total	$9.95

Required:

a. Compute the firm's operating income before income taxes if the firm produced and sold 110,000 units.

b. For the current year, the firm expects to sell the same number of units as it sold in the prior year. However, in a trade newspaper, the firm noticed an invitation to bid on selling LM to a state government. There are no marketing costs associated with the order if Davis is awarded the contract. The company wishes to prepare a bid for 40,000 units at its full manufacturing cost plus $ 0.25 per unit. How much should it bid? If Davis is successful at getting the contract, what would be its effect on operating income?

c. Assume that the company is awarded the contract on January 2, and in addition it also receives an order from a foreign vendor for 40,000 units at the regular price of $15 per unit. The foreign shipment will require the firm to incur its normal marketing costs. The government contract contains a 10-day escape clause (i.e., the firm can reject the contract within 10 days without any penalty). If the firm accepts the government contract, overtime pay at 1 1/2 times the straight time rate will be paid on the 40,000 units. In addition, fixed overhead will increase by $60,000 and variable overhead will behave in its normal pattern. The company has the capacity to produce both orders. Decide the following:

   1. Should the firm accept the foreign offer? Show the effect on operating income of accepting the order.

   2. Assuming the foreign order is accepted, should the firm accept the government order? Show the effect on operating income of accepting the government order.

ANS:

a. Sales (110,000 × $15)	$1,650,000
- VC (110,000 × $5.55)	(610,500)
= CM	$1,039,500
- FC ($450,000 + $210,000)	(660,000)
= Operating Income	$ 379,500

b. Full cost to manufacture = $7.50
+ profit .25
Bid $7.75

SP	$7.75	
- VC	(4.50)	
CM	$3.25	× 40,000 units = $130,000 increase in operating income.

c. 1. SP $15.00
- VC (6.55) ($1 + $3 + $1.50 + $1.05)
CM $ 8.45 × 40,000 = $338,000
- FC (60,000)
Increase in Operating Income $278,000

2. Both orders can be accepted even if the increased costs of $40,000 for labor and $60,000 for fixed overhead are assigned to the government order.

DIF: Difficult OBJ: 10-3

9. Thomas Wilson operates a woodworking shop that makes tables and chairs. He has 25 employees working 40 hours per week, and he has 750 hours per week available in machine time. Wilson knows that he must make at least four chairs for every table. He has also determined the following additional requirements:

	Labor hours	Machine hours	Contribution margin
Table	5	2	$18
Chair	3	1	4

Write the objective function and constraints for the above problem.

ANS:
Objective function: Max CM = 18X + 4Y

Subject to: $4X - Y > 0$
$5X + 3Y \leq 1{,}000$
$2X + Y \leq 750$

X = # of tables
Y = # of chairs

DIF: Difficult OBJ: 10-8