Chapter 2: The Cost Function

Learning Objective	True / False	Multiple Choice	Matching	Exercises	Short Answer	Problems
1: What are different ways to describe cost behavior?	1-54	1-13, 2114, 68-7460-66 S: 75-83 W: 91-93, 97-103, 106, 107	1, 2	76-9, 8, 9,13	1, 6	2, 3, 6, 8, 9
2: What is a learning curve?	5-8	14-20, 67 S: 84, 85		6, 10, 14		
23: What process is used to estimate future costs?	9-116-10, 18, 19	22-2915-22				4, 6, 8, 9, 10
34: How are engineered estimates, account analysis, and two-point methods used to estimate cost functions?	12, 13, 16, 1711-14	30-3823-31, 4033, 4134, 4538, 4639, 6659 W: 104		1-5, 87, 9,8 101	4, 11	3, 5
45: How does a scatter plot assist with categorizing a cost?	14, 1515,16	42-4435-37, 4740 W: 94			7	
56: How is regression analysis used to estimate a mixed cost function?	21-2317-19	3932, 50-6343-56 S: 86-90 W: 95, 96	3	1211, 1514	4, 11	1, 2, 6, 7
67: What are the uses and limitations of future cost estimatesHow are cost estimates used in decision making?	20, 24-2621-23	4841, 4942, 6457, 6558 W: 105		2, 4, 110-143, 156	2-5, 8-10	1-9

S: Questions from the study guide
W: Questions from web quizzes on the student web site

Level of Complexity*	True / False	Multiple Choice	Matching	Exercises	Short Answer	Problems
Foundation: Repeat or paraphrase information; Reason to single correct solution; Perform computations; etc.	All	All	All	1-12, 134	1-8, 11	1-7, 9
Step 1: Identify the problem, relevant information, and uncertainties				4, 110-143, 165	3, 4, 9, 10	1-4, 7-9
Step 2: Explore interpretations and connections					8	1, 5, 6, 8
Step 3: Prioritize alternatives and implement conclusions						
Step 4: Envision and direct strategic innovation						

*Based on level in Steps for Better Thinking (Exhibit 1.10, textbook p. 16):
Note: Step 1, 2, 3, and 4 questions in this test bank are intentionally open-ended and subjective, giving students the opportunity to demonstrate skills such as judgment, reasoning, identification of uncertainties, identification or analysis of pros and cons, and so on. Therefore, student answers may not exactly match those shown in the solutions.

Commented [mbs2421]: As currently set up, there are no TB questions for the appendices. Do we want them?

Commented [mbs2422]: S&W not worked on.

True / False

1. Steel used in the production of automobiles would generally be classified as a direct cost.
2. Traceability can be used as a criterion to differentiate direct and indirect costs.
3. Textbook costs are an opportunity cost of earning a college degree.
4. Salaries and wages you could earn while in college constitute a sunk cost.
5. ~~The learning curve refers to declines in the cost of materials as production volume increases.~~
6. ~~The learning curve refers to increases in sunk costs as production volume decreases.~~
7. ~~A new product's learning curve rate can be expressed as (direct material cost / total cost).~~
8. 5. Learning curves lead to greater productivity over time.
9. 6. Past costs are irrelevant for both decision making and predicting future costs.
7. 10. Past costs are relevant for decision making, but irrelevant for predicting future costs.
8. 11. Past costs are irrelevant for decision making, but may be relevant for predicting future costs.
18. 9. The first step in estimating a cost function for relevant costs is to select a cost estimation technique.
19. 10. Categorizing costs by their behavior is one step in estimating relevant costs for a cost object.
1. 2. 1. Managers should be trained in engineering to calculate an engineered cost estimate.
1. 2. 3. Reviewing the pattern of a cost over time is a critical step in determining an engineered cost estimate.
14. ~~A scatter plot provides helpful information about the relationship between a cost and a potential cost driver.~~
15. ~~Preparing a scatter plot is a requirement before applying the two-point method of cost estimation.~~
1. 3. 6. The high-low method is a specific application of the two-point method of cost estimation.
1. 4. 7. The high-low method frequently distorts a cost function because it uses too many data points to make an estimate.
18. ~~The first step in estimating a cost function for relevant costs is to select a cost estimation technique.~~
19. ~~Categorizing costs by their behavior is one step in estimating relevant costs for a cost object.~~
1. 5. 4. A scatter plot provides helpful information about the relationship between a cost and a potential cost driver.
1. 6. 5. Preparing a scatter plot is a requirement before applying the two-point method of cost estimation.
21. 17. Regression analysis is classified as simple or multiple depending upon the number of dependent variables to be estimated.
22. 18. Simple regression analysis produces an equation of the form: $Y = \alpha + \beta X + \varepsilon$.
23. 19. In regression analysis, the Adjusted R-square statistic is used to evaluate how well the cost driver explains the behavior in the cost.
20. Uncertainties and information quality are evaluated when determining relevant costs, then not considered again.
21. ~~Regression analysis is classified as simple or multiple depending upon the number of dependent variables to be estimated.~~
22. ~~Simple regression analysis produces an equation of the form: $Y = \alpha + \beta X + \varepsilon$.~~

~~23. In regression analysis, the Adjusted R-square statistic is used to evaluate how well the cost driver explains the behavior in the cost.~~

~~24~~21. Estimates of future costs ~~can be used in budgeting~~are most useful in long term budgeting.

~~25~~22. Regression analysis usually provides a higher quality cost function than the high-low method.

~~26~~23. Changes in cost behavior over time are one source of uncertainty in estimating future costs.

Multiple Choice

1. When the cost object is a unit produced, lubricating oil for production machines would be a(n)
   a. Direct cost
   b. Indirect cost
   c. Sunk cost
   d. Opportunity cost

2. When the cost object is a unit produced, straight-line depreciation on manufacturing equipment would be a

	Variable Cost	Fixed Cost	Direct Cost
a.	No	Yes	No
b.	Yes	No	No
c.	Yes	No	Yes
d.	Yes	No	Yes

3. Fixed costs per unit
   a. Vary inversely with changes in volume
   b. Change regardless of changes in volume
   c. Will not change over the relevant range
   d. Increase with an increase in volume

4. Mixed costs
   a. Consist of fixed and variable costs
   b. Are constant in total
   c. Consist of the variable portion of all costs
   d. Have a constant per-unit value

5. Mixed costs
   a. Vary with production in direct proportion to volume
   b. Vary with production but not in direct proportion to volume
   c. Do not vary with production
   d. Include only different types of fixed costs

6. The relevant range is defined as
   a. The period of time over which costs do not change
   b. The volume of production over which the cost assumptions hold
   c. The volume of production over which step-wise fixed costs increase
   d. The time period in which the level of production does not change

7. Which of the follow is not an assumption when estimating a cost function over the relevant range of activity?
   a. Mixed costs will change in total
   b. Mixed costs will change per unit
   c. Variable costs will be constant in total
   d. Fixed costs will be constant in total.

Use the following data for the next 6 questions:
Janice's Kennel and Pet Spa is located in a small town in central California. The company employs three pet attendants, four pet groomers and two front office staff who book appointments and keep records. The spa provides a range of services for dogs and cats including boarding, grooming, and obedience training. The grooming area includes a small retail section that carries dog and cat food, pet supplies, and toys.

8. If the cost object is cost per day of boarding, which of the following is a direct cost?
   a. Pet food
   b. Front office staff salaries
   c. Grooming supplies
   d. Depreciation on shelving and equipment used in the grooming and retail area

9. If the cost object is the total cost of the grooming product line, which of the following is an indirect cost?
   a. Front office staff salaries
   b. Labor cost of employees who groom pets
   c. Cost of grooming supplies
   d. Depreciation on grooming tables

10. Which of the following is a sunk cost for any cost object related to Janice's Kennel and Pet Spa?
   a. Cost of the automobile Janice is planning to buy for pet transportation
   b. Cost of existing computer equipment used to keep company records
   c. Cost of annual wages for full-time employees
   d. Cost of rent for the next period

11. Assume Janice's Kennel and Pet Spa is currently boarding ten pets. The cost of food to board one more pet is best described as a
   a. Fixed cost
   b. Marginal cost
   c. Sunk cost
   d. Mixed cost

12. Which of the following is the best example of a discretionary cost for Janice's Kennel and Pet Spa?
   a. Pet food
   b. Facility rent
   c. Wages of pet groomers
   d. Professional travel for Janice

13. Janice's relevant range of activity would best be measured in terms of:
   a. The number of staff she employs
   b. The number of pets she services
   c. The maximum amount of pet food she can buy each month based on the current budget
   d. The number of parking spaces available in the parking lot

~~21~~14. Discretionary costs reflect
   a. The costs that managers incur to purchase new production machines when the old machines need replacing
   b. Decisions about the maximum amount that will be spent next period for activities such as travel and marketing
   c. Decisions about the amount of variable costs that will be incurred next period
   d. The costs that managers incur to pay overtime when production levels are high

~~**Use the following values as needed to respond to the next 5 questions.**~~
~~ln(95%) / ln(2) = 0.074~~
~~ln(90%) / ln(2) = 0.152~~
~~ln(85%) / ln(2) = 0.234~~
~~ln(80%) / ln(2) = 0.322~~
~~ln(75%) / ln(2) = 0.415~~
~~ln(70%) / ln(2) = 0.515~~

~~14. The labor cost to construct the first unit of a special piece of equipment was $126,000. If labor costs are subject to a 90% learning curve, what will be the cost to build the second unit?~~

~~a. $126,000~~
~~b. $113,000~~
~~c. $100,800~~
~~d. $113,400~~

15. A firm will build 8 units of a product. All costs are subject to an 85% learning curve. The first unit cost $75,000 to build. If the firm values inventory and cost of goods sold at the average cost for all units in the production run, what will be the cost to produce the second unit?
    a. $63,750
    b. $69,375
    c. $75,000
    d. Some other amount

16. Assume an 80% learning curve and that the first unit takes 6 hours. How long does it take to produce the second unit?
    a. 4.1 hours
    b. 3.6 hours
    c. 4.8 hours
    d. Some other amount

17. Managers at Art's Custom Saddle Manufacturers believe that the learning rate for new employees is about 90%. If it takes a new employee 10 hours to make the first saddle, estimate the cumulative average time per saddle for a new employee to make four saddles.
    a. 8.1 hours per saddle
    b. 5.3 hours per saddle
    c. 7.6 hours per saddle
    d. Cannot be determined

18. The cumulative average-time learning curve can be represented mathematically as
    a. ln(percent learning) / ln(2)
    b. $Y = \alpha X^r$
    c. $Y = \alpha Xr$
    d. $\alpha = YX^r$

19. A learning curve is the rate at which
    a. Students learn material for an exam
    b. Direct labor employees are provided training by their organizations
    c. Labor hours decrease as production increases when a new product is manufactured
    d. Profitability decreases because employees have become less efficient.

20. Bob and James are installing new flooring in their home. The house has 5 rooms of approximately equal size where the flooring will be replaced. Bob and James spent 3 hours removing the old flooring from the first room. If Bob and James are operating with an 85% learning curve, what is the estimated average time to remove the flooring from all 5 rooms? Note: ln(85%) / ln(2) = −0.234.
    a. 2.05 hours total
    b. 2.05 hours per room
    c. 2.55 hours total
    d. 2.55 hours per room

21. Discretionary costs reflect
    a. The costs that managers incur to purchase new production machines when the old machines need replacing
    b. Decisions about the maximum amount that will be spent next period for activities such as travel and marketing
    c. Decisions about the amount of variable costs that will be incurred next period
    d. The costs that managers incur to pay overtime when production levels are high

~~22~~15. Which of the following statements is true?
a. Past costs are always relevant for decisions and are often useful in estimating future cost behavior
b. Past costs are always relevant for decisions, but are rarely useful in estimating future cost behavior
c. Past costs are never relevant for decisions, nor are they useful in estimating future cost behavior
d. Past costs are never relevant for decisions, but are often useful in estimating future cost behavior

~~23~~16. The best source for determining historical costs is usually
a. The Internet
b. Interviews with managers
c. The company's accounting information system
d. Financial statements

~~24~~17. Which of the following statements is false?
a. Information for some costs cannot easily be obtained from the accounting information system.
b. Useful cost information is rarely available from the accounting information system.
c. The accounting system design affects the availability of useful cost information.
d. The nature of cost information affects its usefulness for decision making.

~~25~~18. In most accounting information systems, costs are often recorded and coded so they can be summarized based on different
a. Cost drivers
b. Cost objects
c. Volumes of activity
d. Independent variables

~~26~~19. Past cost information, although accurate in predicting future costs, may be
I. Unavailable
II. Irrelevant
III. Outdated
a. I and II only
b. II and III only
c. II only
d. I, II, and III

~~27~~20. Managers go through a series of questions to decide whether to use past costs to estimate future costs. Which of the following questions is least likely to be one of them?
a. Is the cost relevant to the decision?
b. Is the cost highly discretionary?
c. Is the cost an engineered estimate?
d. Is the cost expected to change?

~~28~~21. Estimating a cost function using past cost data to help determine future costs is useful if
a. Past costs are irrelevant and highly discretionary
b. Past costs are irrelevant and not discretionary
c. Past costs are relevant and highly discretionary
d. Past costs are relevant and not discretionary

~~29~~22. After estimating a past cost function, managers
I. May need to update it for future changes.
II. Have all of the information they need to predict future costs
III. May or may not use it to estimate future costs.
a. I only
b. II only
c. II and III only
d. I and III only

Use the following data for the next 3 questions.
Liva Company wants to develop a cost function for its maintenance costs to estimate such costs for the coming year. The following data are available:

Month	Direct Labor Hours	Maintenance Costs Incurred
January	4,000	$ 900
February	6,500	1,325
March	7,000	1,500
April	5,500	1,150

~~30~~23. Using the high-low method, what is the variable maintenance cost per direct labor hour?
a. $1.00
b. $0.10
c. $0.20
d. $1.50

~~31~~24. Using the high-low method, what is the fixed maintenance cost?
a. $500
b. $300
c. $200
d. $100

~~32~~25. Using the high-low method, what is the cost function for maintenance costs?
a. $500 + $1.00 per direct labor hour
b. $300 + $1.50 per direct labor hour
c. $100 + $0.20 per direct labor hour
d. $200 + $0.10 per direct labor hour

~~33~~26. The major disadvantage of the high-low method is that
a. It uses the two most extreme data points in determining a cost function
b. It is difficult to calculate
c. It is difficult to understand
d. It involves more judgmental factors than do other methods

Use the following data for the next 3 questions.
Cosby Company is attempting to develop the cost function for repair costs. The following past data are available:

Machine Hours	Repair Costs
4,800	$6,385
3,400	4,585
4,000	5,285
5,900	7,085

~~34~~27. Using the high-low method, what is the variable repair cost per machine hour?
a. $0.15
b. $1.00
c. $4.00
d. $5.00

~~35~~28. Using the high-low method, what is the fixed repair cost?
a. $1,185
b. $850
c. $475
d. $565

~~36~~29. Using the high-low method, what is the estimated repair cost for 4,500 machine hours?
a. $5,785
b. $5,585
c. $5,685
d. $5,985

Use the following data for the next 2 questions.
Milano Company has an average overhead cost per hour of $10.50 at 3,500 machine hours, and at 3,000 hours it is $11.25. The company managers wish to estimate the overhead cost function.

~~37~~30. What is the variable overhead cost per machine hour?
a. $1.00
b. $2.00
c. $6.00
d. $8.00

~~38~~31. What is the fixed overhead cost?
a. $15,750
b. $36,750
c. $21,000
d. $18,000

~~39~~32. Assuming that a cost is mixed and linear, and that past cost behavior is expected to continue into the future, which of the following is mostly likely the best technique for estimating future costs?
a. Engineered estimate of cost
b. Two-point method
c. Scatter plot
d. Regression analysis

~~40~~33. Managers analyze production activities and assign costs based on the estimated amount of resources used when they use this method.
a. A scatter plot
b. The high-low method
c. Regression analysis
d. Engineered estimate of cost

~~41~~34. Reviewing cost behavior patterns over time from the accounting records and using that review to predict future costs best describes
a. Regression analysis
b. Scatter plots
c. Analysis at the account level
d. Two-point methods

~~42~~35. Which of the following techniques relies on visual analysis?
a. Scatter plots
b. Analysis at the account level
c. High-low method
d. Engineered estimate of cost

~~43~~36. A scatter plot is especially useful when managers wish to
a. Compute a cost function
b. Update a past cost function for future changes
c. Study the relationship between a cost and a potential cost driver
d. Analyze cost behavior when only one period of data is available

~~44~~37. The trend line from a scatter plot can be used to identify data points for
a. The two-point method
b. Analysis at the account level
c. Engineered estimate of cost
d. Regression analysis

~~45~~38. The high-low method is a specific application of this method of cost estimation
a. Two-point
b. Scatter plot
c. Engineered estimate of cost
d. Analysis at the account level

~~46~~39. Which of the following is the most valid criticism of the high-low method?
a. It never produces accurate results
b. It is mathematically too complex for most managers to comprehend
c. It is a specialized case of the two-point method
d. Data points might be outside the normal range of activity

~~47~~40. A manager might use this method to create a graph of cost behavior without any statistical techniques
a. Engineered estimate of cost
b. High-low method
c. Scatter plot
d. Regression analysis

~~48~~41. Which of the following cost estimation techniques makes assumptions about the data being analyzed?
I. Analysis at the account level
II. Two-point method
III. Regression analysis
a. I only
b. I and II only
c. II and III only
d. I, II, and III

~~49~~42. Which cost estimation technique is useful in all situations?
a. Analysis at the account level
b. Regression analysis
c. Two-point method
d. No one method is useful in all situations

~~50~~43. An organization's accountant is estimating next period's total overhead costs. She performed two regression analyses, one based on direct labor hours and the other based upon machine hours. The results were:

Total overhead = $150,000 + $4 x direct labor hours
Adjusted R-square = 0.65

Total overhead = $130,000 + $5 x machine hours
Adjusted R-square = 0.77

For the next period the accountant anticipates using 28,000 direct labor hours and 26,000 machine hours. Based upon this information, what is the best estimate for overhead for the next period?
a. $262,000
b. $260,000
c. $254,000
d. $270,000

~~51~~44. (Appendix 2A) Which of the following is **not** an assumption of linear regression analysis
a. The error terms have a constant variance
b. The error terms are independent
c. A linear relationship exists between the dependent and independent variables
d. There is a cause and effect relationship between the dependent and independent variables

~~52~~45. Which of the following are forms of regression analysis?
a. Quantitative and qualitative
b. Fixed and variable
c. Simple and multiple
d. Financial and managerial

~~53~~46. Simple regression analysis differs from multiple regression analysis based on the number of
a. Cost drivers used
b. Costs predicted
c. Data points incorporated
d. Personnel analyzing the data

~~54~~47. Simple regression minimizes the distance from each data point to
a. A trend line
b. The y-intercept
c. The error term
d. The x-axis

~~55~~48. Which of the following is an alternative name for a cost driver in a regression analysis?
a. Dependent variable
b. Independent variable
c. Beta
d. Error term

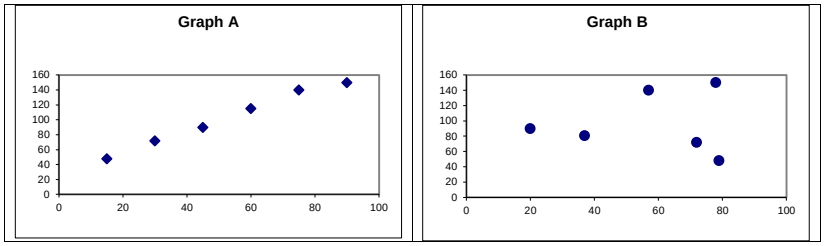
~~56~~49. Which of the following is an alternative name for the cost being predicted in a regression analysis?
a. Dependent variable
b. Independent variable
c. Beta
d. Slope

~~57~~50. Regression analysis works best when the relationship between costs and cost drivers is
a. Positive and linear
b. Linear and direct
c. Positive and indirect
d. Positive, linear, and indirect

~~58~~51. In a regression equation, fixed costs are represented by the
a. Slope
b. Intercept
c. Error term
d. Adjusted R-square coefficient

~~59~~52. In a regression equation, variable costs are represented by the
a. Slope
b. Intercept
c. Adjusted R-square coefficient
d. t-statistic

Use the following graphs for the next 2 questions.



~~60~~53. Which graph shows data that are more suitable for regression analysis?
a. Graph A
b. Graph B
c. Neither Graph A nor Graph B
d. Cannot be determined

~~61~~54. Simple regression analysis output produces a variety of information and statistics. Which of the following statistics provides information for fixed costs?
a. T-statistic and p-value for the alpha coefficient
b. T-statistics for alpha and beta coefficients
c. Adjusted R-square
d. P-values for alpha and beta coefficients

~~62~~55. Simple regression analysis output produces a variety of statistics. Which of the following statistics provides information for variable costs?
a. Adjusted R-square
b. P-values for alpha and beta coefficients
c. T-statistic and p-value for the beta coefficient
d. T-statistics for alpha and beta coefficients

~~63~~56. Simple regression analysis output produces a variety of statistics. Which of the following statistics best summarizes how well the cost driver explains the behavior of the cost?
a. T-statistics for alpha and beta coefficients
b. T-statistic and p-value for the alpha coefficient
c. P-values for alpha and beta coefficients
d. Adjusted R-square

~~64~~57. When estimating future costs, information quality is higher when
a. Costs must be allocated
b. The accounting system can trace relevant costs to a cost object
c. The regression Adjusted R-square is near zero
d. Most costs are fixed, rather than variable

~~65~~58. Past cost information might be too unreliable for future cost estimation because
a. An organization has been operating too long in a stable environment
b. The costs are primarily mixed
c. A company has added a new product line
d. Managers expect no changes in the cost function

6659. This method of estimating future costs can be used when only one period of data is available.
a. Scatter plot
b. High-low method
c. Analysis at the account level
d. Regression analysis

More Difficult Multiple Choice

These multiple choice questions require more complex computations or present information differently than in the textbook.

67. Bob and James are installing new flooring in their home. The house has 5 rooms of approximately equal size where the flooring will be replaced. Bob and James spent 3 hours removing the old flooring from the first room. The average time to remove the flooring from 2 rooms is 2.25 hours per room. Determine the learning curve percentage experienced by Bob and James.

Below are values that may be useful in answering this question.

ln(95%) / ln(2) = 0.074
ln(90%) / ln(2) = 0.152
ln(85%) / ln(2) = 0.234
ln(80%) / ln(2) = 0.322
ln(75%) / ln(2) = 0.415
ln(70%) / ln(2) = 0.515

a. 70%
b. 75%
c. 80%
d. Some other percentage

Use the following information for the next 3 questions.
Consider the following cost data for the cost object, number of machine setups. Each set of costs (A, B, and C) is from a different type of manufacturing operation and represents the cost behavior for the cost of that company's machine setups.

Number of Machine Setups	Cost A	Cost B	Cost C
0	$ 0	$80	$ 5
10	20	79	37
20	40	82	66
30	60	78	91
40	80	81	123
50	100	79	154

6860. Cost A is best described as
a. Fixed
b. Variable
c. Mixed
d. Direct

6961. Cost B is best described as
a. Fixed
b. Variable
c. Mixed
d. Discretionary

~~70~~62. Cost C is best described as
a. Fixed
b. Variable
c. Mixed
d. Indirect

Use the following information for the next 3 questions.
Three different divisions of a toy manufacturing company are estimating costs for their human resources departments. Each division has a cost structure that is different from the other divisions' and those structures are represented by the following cost behavior patterns (A, B, and C).

Number of Employees	Cost A	Cost B	Cost C
0	$ 0	$120	$118
25	50	118	180
50	100	123	245
75	125	124	296
100	200	119	360

~~71~~63. Which cost is best described as fixed?
a. Cost A
b. Cost B
c. Cost C
d. Cost B and Cost C

~~72~~64. Which cost is best described as variable?
a. Cost A
b. Cost B
c. Cost C
d. Cost A and Cost C

~~73~~65. Which cost is best described as mixed?
a. Cost A
b. Cost B
c. Cost C
d. Cost B and Cost C

~~74~~66. A firm has the capacity to produce 3,100 units per week. At 80% capacity, the average total cost per unit is $12.50 and the average variable cost per unit is $7.50. What is the total fixed cost per week, assuming the firm is still operating within its relevant range?
a. $10,400
b. $14,400
c. $ 8,400
d. $12,400

Multiple Choice from Study Guide

S75. Fixed costs
a. Do **not** vary in total within the relevant range
b. Do **not** vary on a per-unit basis within the relevant range
c. Vary on a per-unit basis in direct proportion to changes in the cost driver within the relevant range
d. Vary in total as the cost driver changes within the relevant range

[s]76. Variable costs
a. Do not vary in total within the relevant range
b. Do not vary on a per-unit basis within the relevant range
c. Vary on a per-unit basis within the relevant range
d. Both (a) and (c)

[s]77. Which of the following could be defined as a cost object?
a. A single unit of product in a manufacturing process
b. A batch of products in a manufacturing process
c. A business process, such as managing accounts receivable
d. All of the above

[s]78. Which of the following statements is false?
a. A cost can be defined as a direct cost if the bookkeeping system can keep track of how much of the cost was consumed by the cost object
b. Whether a cost is direct or indirect cannot be determined until the cost object has been defined
c. If the cost object is a batch of 1000 units of production, then factory property taxes could be a direct cost if the bookkeeping system is detailed enough
d. Some indirect costs might have been considered direct costs if a company had better technology for capturing information

[s]79. The total cost of salaries of production supervisors, where 2 supervisors are needed for each 8-hour shift, where the relevant range is 0 units to the number of units that can be produced at full capacity using 2 8-hour shifts is a
a. Fixed cost
b. Variable cost
c. Mixed cost
d. Stepwise linear cost

[s]80. The total cost of materials, where the supplier charges $9/lb if 0-1000 pounds are purchased, $8/lb if 1001-2000 pounds are purchased and $7 if 2001 or more pounds are purchased, is a
a. Fixed cost
b. Variable cost
c. Mixed cost
d. Stepwise linear cost

[s]81. The rent on a store, where the landlord charges $1,200 per month plus a percentage of sales revenue, is a
a. Fixed cost
b. Variable cost
c. Mixed cost
d. Stepwise linear cost

[s]82. The depreciation on a factory machine is a
a. Fixed cost
b. Variable cost
c. Mixed cost
d. Stepwise linear cost

[s]83. Which of the following statements is true?
a. Opportunity costs are never relevant for decision making
b. Discretionary costs are never relevant for decision making
c. Marginal costs are never relevant for decision making
d. Sunk costs are never relevant for decision making

$84. If firm A has a learning curve with 90% learning and firm B has a learning curve with 80% learning, then
a. Firm A has more experienced workers
b. Firm B will be more cost efficient over time
c. Firm A workers learn more quickly
d. Firm B has less experienced workers

$85. A firm's production is expected to show an 85% learning rate. The first unit took 200 hours to produce. The second unit will take
a. 170 hours
b. 140 hours
c. 200 hours
d. 289 hours

$86. A high adjusted R-square for the regression of a cost against a cost driver indicates
a. The predicted linear relationship between the cost and the cost driver is probably correct
b. The relationship between the cost and the cost driver is probably linear
c. The cost driver explains a high percentage of the variation of the cost
d. The cost driver is statistically significant

$87. A p-value of 1% for the intercept term in a regression of a cost driver against a cost indicates
a. The true fixed costs are statistically significantly different from zero
b. There is only a 1% chance the true fixed costs are zero
c. The variable costs are immaterial in this cost function
d. Both (a) and (b)

$88. A p-value of 89% for the slope coefficient in a regression of a cost driver against a cost indicates
a. The true variable costs are statistically significantly different from zero
b. There is only an 11% chance the true variable costs are zero
c. The relationship between the cost and the cost driver is nonlinear
d. None of the above

$89. The difference between simple regression and multiple regression is that
a. Simple regression is easier to perform in Excel than multiple regression
b. Simple regression is only performed once when estimating a cost function, whereas multiple regression is performed more than once
c. Simple regression uses only one cost driver, whereas multiple regression uses more than one cost driver
d. Simple regression is for estimating only one cost, and multiple regression is for estimating more than one cost

$90. A regression of total selling expenses against number of units sold yields an intercept of 178,024 and a slope of 12.3. This indicates that
a. Total fixed selling expenses are predicted to be $178,024.
b. Variable selling expenses are predicted to be $12.30/unit.
c. Total selling expenses are predicted to be $190,324 when 1000 units are sold
d. All of the above

Multiple Choice from Web Quizzes (Available on Student Web Site)

ʷ91. If we are determining costs for a particular case at a law office, the cost of rent for the office would be
a. A direct cost
b. An indirect cost
c. A mixed cost
d. An irrelevant cost

ʷ92. If we want to estimate the cost of lumber for manufacturing chairs, the cost function most likely reflects
a. Only a variable cost
b. Only a fixed cost
c. A mixed cost
d. An irrelevant cost

ʷ93. Which one of following is not a reason to take into account the relevant range when estimating a cost?
a. The cost function is nearly linear within a relevant range
b. It is reasonable to assume that fixed costs remaining fixed in this range
c. It is reasonable to assume that variable costs remain constant in this range
d. We cannot make assumptions about linearity within a relevant range

ʷ94. If you create a scatter plot of a cost against a cost driver
a. You gain information about whether there is a seeming relation between the cost and cost driver
b. For all costs, you will have completed your analysis
c. You gain no new information about the relationship between the cost and cost driver
d. You will not need to perform regression analysis to estimate the cost function

ʷ95. In a regression analysis for estimating a cost function, t-statistics and their p-values do not provide information about
a. Whether the cost and cost drivers are related
b. How confident we can be that the intercept or slope coefficients are different from zero
c. The amount of variation in cost that is explained by variation in the cost driver
d. Whether the cost is totally fixed, totally variable, or mixed

ʷ96. In a regression analysis for estimating a cost function, the adjusted R-Square statistic provides information about
a. The amount of variation in cost that is explained by variation in the cost driver
b. The size of the slope coefficient
c. Whether the cost is a fixed, variable, or mixed cost
d. How confident we can be that the intercept or slope coefficients are different from zero

ʷ97. Marginal cost is
a. The average cost per unit
b. The incremental cost of the next unit
c. Not relevant for decision making
d. Constant even if the relevant range changes

ʷ98. All of the following are true about average cost per unit except
a. Average cost equals variable cost per unit plus average fixed cost per unit
b. Average costs are used in financial statements
c. Average costs are usually irrelevant for decision making because they include a portion of fixed cost
d. Average costs are usually good estimates of future costs

ʷ99. Opportunity costs are
a. Benefits foregone from one project because another project is chosen
b. Irrelevant
c. The same as sunk costs
d. Easy to value

ʷ100. Sunk costs are
a. The same as opportunity costs
b. Expenditures made in the past
c. Relevant to decisions
d. Difficult to value

ʷ101. Direct costs are
a. Costs that need to be assigned but cannot be traced easily to cost objects
b. Only variable costs
c. Costs that can easily be traced to cost objects
d. Only fixed costs

ʷ102. Indirect costs are
a. Costs that need to be assigned but cannot easily be traced to cost objects
b. Only variable costs
c. Costs that can easily be traced to cost objects
d. Only fixed costs

ʷ103. All of the following are examples of variable costs except
a. The cost of tires if the cost object is the number of automobiles produced
b. Professional labor cost when the cost object is the audit of a business
c. The cost for wood in a baseball bat manufacturing company if the cost object is bats produced
d. The cost to lease a manufacturing plant if the cost object is the product manufactured

ʷ104. All of the following are true about analysis at the account level except
a. It is a method for separating fixed and variable costs
b. It uses information from the general ledger
c. It is a qualitative method for separating costs
d. It requires very little judgment to determine cost behavior

ʷ105. All of the following are assumptions for developing and using a cost linear function except
a. Past costs rarely need updating to be good predictors of future costs
b. Operations are within the relevant range
c. Variable costs remain constant within the relevant range
d. Fixed costs remain fixed within the relevant range

ʷ106. The relevant range in cost accounting is the range over which
a. Costs may fluctuate
b. Cost relationships are valid
c. Production may vary
d. Relevant costs are incurred

ʷ107. (CMA) Cost drivers are
a. Activities that cause costs to increase as the activity increases
b. Accounting techniques used to control costs
c. Accounting measurements used to evaluate whether or not performance is proceeding according to plan
d. A mechanical basis, such as machine hours, computers time, size of equipment, or square footage used to assign costs to activities.

Matching

1. ABC Manufacturing wants to determine whether its various product costs are direct or indirect, and variable or fixed. This information will be used to determine product unit costs. All employees are guaranteed a 40 hour work-week except factory employees, who are paid an hourly wage and can be sent home when there is no work. The following classification scheme has been developed:

   A. Direct variable cost
   B. Indirect variable cost
   C. Direct fixed cost
   D. Indirect fixed cost

   Using the categories shown above, indicate how each of the following costs should be classified if the cost object is a single unit of product:

   ____ 1. Labor in the maintenance department
   ____ 2. Glue and tacks used in production
   ____ 3. Lubricating oil for production machines
   ____ 4. Salary of the plant accountant
   ____ 5. Oil used for monthly preventive maintenance on production machines
   ____ 6. Insurance on the plant machinery
   ____ 7. Hourly factory wages
   ____ 8. Wages in the materials receiving and handling department
   ____ 9. Taxes on plant equipment
   ____ 10. Shipping costs for direct materials

2. Various terms are listed in the right-hand column below; several definitions are listed on the left. Match the appropriate term with each definition. Some of the lettered terms may be used more than once, while others may not be used at all. Each numbered definition has only one best response.

   ____ 1. A thing or activity for which managers measure costs
   ____ 2. Input or activity that causes changes in costs
   ____ 3. Analysis at the account level
   ____ 4. Cost incurred in the past
   ____ 5. Easily traced to individual cost objects
   ____ 6. Has a cause-and-effect relationship with costs
   ____ 7. Often estimated based on a budget established by management
   ____ 8. Often increase in a stepwise manner
   ____ 9. Benefits of the next best alternative that we forego when we make a decisions
   ____ 10. Represented mathematically as $TC = F + V \times Q$

   A. Cost driver
   B. Cost estimation method
   C. Cost object
   D. Direct cost
   E. Fixed cost
   F. Indirect cost
   G. Opportunity cost
   H. Mixed cost
   I. Discretionary cost
   J. R-square statistic
   K. Relevant range
   L. Sunk cost

____ 11. Scatter plots

____ 12. Span of activity for which cost behavior can be reliably predicted

3. The steps for using regression analysis to estimate a cost function are listed below in random order. Correctly number the steps from 1 to 8.

____ Write the cost function.

____ Plot the cost for each potential cost driver.

____ Perform the regression analysis.

____ Generate a list of possible cost drivers.

____ Gather cost and cost driver data.

____ Evaluate the sign and significance of the cost function's components.

____ Discard potential cost drivers that fail to explain a high proportion of variability in the cost.

____ Consider the behavior of the cost.

Exercises

1. The average cost of producing 200 units is $82 for Alpha Company. If production increases by 300 units, the average cost falls to $61.
   a. What is the variable cost per unit?
   b. What is the fixed cost?
   c. What is the average cost of producing 250 units?

2. Total fixed costs are $20,000 per month and last month total variable costs were $7,000 when total revenue was $28,000.
   a. Write the algebraic expression for this flexible budget for total cost.
   b. What assumptions are made for a linear cost function like this?

3. The average cost to produce 10,000 units is $88.00, and the average cost to produce 15,000 units is $84.00.
   a. Develop a cost function for this cost.
   b. Estimate the average cost to produce 18,000 units.

4. Total fixed costs are $25,000 per year. The variable cost per unit is $10.00 per unit up to 5,000 units per year and $7.50 per unit thereafter.
   a. Develop a cost function for this cost.
   b. What could cause the change in variable costs shown above? Explain
   c. List three assumptions that are made when developing these types of cost functions and give one reason that each assumption might not hold

5. Strawser Company is developing a cost function for its maintenance costs using the high-low method. The following data have been collected for the past year:

Quarter	Direct Labor Hours	Maintenance Costs Incurred
1	5,000	$ 745
2	6,500	820
3	7,000	850
4	8,000	1,000

Calculate the following amounts:
a. The variable cost per direct labor hour
b. The fixed cost
c. The estimated total cost for 9,000 direct labor hours
d. The estimated total cost for 6,000 direct labor hours

~~6. During 20x1, Advanced Systems introduced complex oil well monitoring equipment and produced 100 units in anticipation of selling to the major oil-producing companies. The first unit produced cost $125,000, and production costs are subject to a 90% learning curve. Note: ln(90%) / ln(2) = −0.152.~~

~~During 20x1 the company sold 20 units, and during 20x2 the company sold 40 units. Each unit sells for $100,000. If costs are assigned to cost of goods sold based on the average expected cost for all units in the 20x1 production run, what is the company's gross profit during 20x2?~~

~~7~~6. Chabu's managerial accountant, Yi-Fan, is classifying the company's costs according to their behavior to prepare next year's budget. Therefore, the cost object is the entire company. Chabu produces and sells aluminum beverage cans, such as those used for soft drinks. You may find the following facts about Chabu's operation useful in responding to this problem:

- Production machines must be cleaned monthly, regardless of the amount of use.
- The more cans produced, the more lubrication is needed.
- Chabu's monthly production and sales volume is usually at least 1,000 cans, but can be as much as 5,000 cans depending on demand.
- Material handling costs include depreciation on equipment and fuel for loaders.
- Cans are packaged into 100-unit groups prior to sale.
- Research and development costs vary between $10,000 and $10,500 per month
- The factory maintenance costs vary between $6,000 and $6,500 monthly.
- Chabu's staff level is constant at 25 people, who are all paid salaries.
- Raw materials are purchased based on expected production levels.
- Sales commissions (based on a per-case amount) are included in marketing department costs.

Yi-Fan has classified the costs into three categories: fixed, variable, and mixed.

Place an X in the appropriate column of the table below to indicate the most likely behavior of each cost:

	Fixed	Variable	Mixed
Oil to lubricate the machines			
Salary of the plant manager			
Annual subscription to a trade journal			
Vacation pay for salaried production employees			
Packaging materials			
Research and development			
Raw materials			
Material handling costs			
Marketing department costs			
Factory maintenance			

~~8~~7. The following data were obtained from the accounting information system of POC Corporation:

Month	Units Produced	Raw Materials Used	Factory Supplies	Production Manager Salary
January	60	$1,560	$550	$3,000
February	80	2,000	700	3,000
March	50	1,300	475	3,000
April	30	775	325	3,000

a. Describe the behavior of each of the costs shown above as fixed, variable or mixed. You may wish to draw scatter plots or analyze the cost using your knowledge of costs and the actual variation in cost pattern from above (in other words, perform an informal analysis at the account level).
b. Use the data for February and March and the two-point method to determine a cost function for any mixed cost(s).
c. Use the high-low method to determine a cost function for any mixed cost(s).

~~9~~8. Consider the pairs of data presented below for 3 costs of USM Corporation:

Cost Driver A	Cost A	Cost Driver B	Cost B	Cost Driver C	Cost C
0	1,200	0	0	0	600
80	1,380	130	1,735	110	890
175	1,495	130	1,735	209	1,200
244	1,475	314	5,488	325	1,500
377	1,390	422	6,987	457	1,700
462	1,500	507	8,723	560	2,000

a. Using scatter plots or other informal methods such as studying the variation in cost compared to the variation in cost driver, describe the behavior of each cost.
b. For each cost that you described above, give one example of a cost that would behave similarly. For variable and mixed costs, also identify the cost driver.

~~10~~9. (Appendix 2B) The managers of Web Design Services Company hired three recent college graduates. When they began preparing simple web pages, it took about ten hours to complete the first page. The supervisor believes a 90% learning rate is typical for this type of work. Note: ln(90%) / ln(2) = –0.152.
a. Estimate the cumulative average time per page to prepare six web pages.
b. Estimate the total time to prepare ten web pages.

~~11~~10. Stacy Kuh, the manager of the Ice Cream Igloo, has been told that to earn a reasonable profit she should price her products at 200% of the cost of ingredients. Ms. Kuh has gathered the following data on the cost of ingredients used to make a banana split.

- The distributor charges $12.00 for a dozen bananas; each banana split uses one banana.
- Ice cream costs $3.20 per gallon; each banana split uses two cups of ice cream.
- One gallon of ice cream equals thirty-two cups of ice cream.
- Stacy makes her own fruit toppings at a cost of $0.25 per tablespoon; each banana split uses six tablespoons of fruit toppings.
- Each banana split uses three tablespoons of premium chocolate sauce, which costs $0.25 per tablespoon.
- The cost of other miscellaneous ingredients, such as whipped cream and nuts, totals $0.05 per banana split.

a. Calculate the cost of a banana split.

b. List two factors that could cause these estimated costs to be inaccurate.

~~12~~11. Following are the results from two different simple regression analyses estimating the costs of the purchasing department using number of purchase orders and number of vendors as potential cost drivers.

Purchasing costs vs. Number of purchase orders			
Variable	Coefficient	*t*-statistic	*p*-value
Intercept	497.25	3.39	0.04
Number of purchase orders	18.72	5.48	0.001
Adjusted R-square = 0.79			

Purchasing costs vs. Number of vendors			
Variable	Coefficient	*t*-statistic	*p*-value
Intercept	691.15	1.45	0.25
Number of vendors	115.88	2.75	0.15
Adjusted R-square = 0.53			

a. Which independent variable explains more of the variation in purchasing costs? Explain your choice.
b. Choose the most appropriate cost driver and write the cost function.
c. For an upcoming month, the number of vendors is estimated to be 150, while the number of purchase orders is estimated to be 340. Using the most appropriate cost driver, estimate the total cost for that month.
d. List several uncertainties that could affect the accuracy of the cost function in estimating the cost for the upcoming month.

~~13~~12. NTQ Corporation manufactures and sells compact discs with music and nature sounds as relaxation and concentration tools.
a. Describe why there is no single "correct" way to determine the cost of a compact disc.
b. Identify three reasons why the cost of a compact disc might change or vary over time.

~~14~~13. (Appendix 2B) Bob and Andrea were recently hired as accountants for PTR Corporation. PTR uses an enterprise resource planning (ERP) system to coordinate its accounting, sales, and manufacturing operations. Bob and Andrea must learn to use the ERP system effectively to perform their job duties. Their supervisor expects a 70% learning curve to apply to that task.
a. Define the concept of a "learning curve" in your own words.
b. Identify two reasons why the rate of learning might be different than 70%.

~~15~~14. Eastwood Consulting rents a photocopy machine for a monthly rental of $100 plus $0.02 per copy. Photocopier usage varies from month to month depending primarily on the type and volume of consulting reports completed each month. Photocopier usage and cost data for the past several months are as follows:

Month	Number of Copies	Rental Cost
January	11,498	$330
February	14,649	392
March	12,719	354
April	10,347	307
May	16,114	422
June	12,648	353

The accountant for Eastwood Consulting would like to develop a budget for July's photocopier rental cost. Would regression analysis be an appropriate technique for estimating the cost function? Why or why not?

~~16~~15. Total revenues for the month were $80,000. Total fixed costs were $40,000. Total variable costs were $20,000.
a. Write the algebraic expression for the cost function.
b. Describe the general assumptions of the cost function.
c. Discuss reasons why a cost function might provide poor estimates of future costs.

Short Answer

1. Write out the algebraic formula that represents a cost function, and explain each item in the equation.
2. List the assumptions made when a linear cost function is developed.
3. List one assumption made when a linear cost function is developed and describe a circumstance in which that assumption would not hold.
4. A cost function estimated using regression analysis is more accurate than a cost function estimated using either the high-low method or the two-point method. Explain the differences among the three methods. As you discuss these differences, explain why regression analysis provides higher quality information.
5. List and describe three methods for developing a cost function. List one pro and one con for each method.
6. If the average cost decreases as volume of production increases, what kinds of costs are included in the cost function? Explain your reasoning.
7. Explain how scatter plots are used in the process of developing cost functions.
8. (Appendix 2A) One of the questions that needs to be asked before data from regression analysis is used to develop a cost function is whether the relationship between the cost and the cost driver is economically plausible. Explain what this means. In addition, give an example of a cost with one cost driver that would be economically plausible, and an example of one cost driver that would not be economically plausible.
9. When estimating a cost function, accountants often begin with past cost information if it is available. Explain why accountants cannot be certain that past costs will provide a good estimate of future costs.
10. Minh is a cost analyst for TRN Corporation. As part of his job, he must estimate the cost to manufacture wooden and metal computer desks. A recent cost analysis showed the cost of a wooden desk to be $130, while the cost of a metal desk was $107. Can Minh be confident that the cost to produce a wooden desk next period will be $130? Why or why not?
11. Suppose you are a newly hired accountant for a television production studio. One of your first tasks is to estimate the costs of an upcoming episode of the studio's hit unscripted show, "Who Wants to Be an Accountant?" Identify three potential methods for estimating the costs, and describe them.

Problems

1. Here is the output from two regression models for overhead costs at a university using number of academic programs and number of students as potential cost drivers.

Number of academic programs
Adjusted R-square = 0.72
Intercept = 7,127.75 t-statistic = 2.14 p-value = .05
X1 variable = 240.64 t-statistic = 5.08 p-value = .001

Number of students
Adjusted R-square = 0.55
Intercept = 5,991.75 t-statistic = 1.18 p-value = .35
X1 variable = 3.78 t-statistic = 3.53 p-value = 0.01

a. Develop a cost function for each potential cost driver.
b. Compare the output for the two drivers. Choose the best cost driver for overhead costs and explain how you made that choice.
c. Suppose you use the best cost function from part (b) to estimate overhead cost for the next semester. Why is it highly unlikely that the actual cost will be exactly the same as the cost you estimated?

2. The new cost analyst in your accounting department has just received a computer-generated report that contains the results from a simple regression analysis. He was estimating the marketing department costs using volume of units sold as the cost driver. The summary results of the report appeared as follows:

Variable	Coefficient	t-statistic	p-value
intercept	2,222.35	2.48	p<0.01
X1	12.44	1.39	p = 0.25

Adjusted R-square = 0.40

a. Write an equation for total cost based upon the regression analysis.
b. What does the Adjusted R-square tell you about the quality of information that would be produced using this cost driver? Explain.
c. Is it economically plausible that volume of units sold could drive the costs of the marketing department? Explain.
d. List two other cost drivers that the cost analyst could try and explain why they might be useful.
e. Describe discretionary costs.
f. Is it possible for marketing costs to be discretionary? Explain.
g. Describe how to estimate a discretionary cost.

3. Following are the income statements for Grandview Well-Child Clinic for the years 2004 and 2005:

	2004	2005
Patient Visits	12,000	16,000
Revenue	$216,000	$288,000
Costs:		
Nurses Salaries	80,000	120,000
Vaccine and Syringes	60,000	80,000
Miscellaneous Supplies	19,000	22,000
Administration	50,000	50,000
Surplus	$ 7,000	$ 16,000

A nurse was added as patient visits increased in 2005. This nurse can handle up to 4,000 additional patients in the next period. Miscellaneous supplies include the cost of supplies for medical records. Administration is primarily salary cost of the clinic director.

a. Categorize each cost as fixed, variable, or mixed, and explain your categorizations.
b. If you have categorized a cost as mixed, use the high-low method to separate out the fixed and variable portions.
c. Develop a cost function for Grandview Well-Child Clinic.
d. Predict the cost for 18,000 patients in 2006.
e. List two factors that could affect patient volumes. Can the managers be certain that the volume of patients expected in 2005 will 18,000? Explain

4. You work for a company that manufactures computer chips. You need to develop a cost function for maintenance cost, which consists of the cost for routine maintenance and repair of machines used to manufacture the chips.
   a. List the steps you would take to develop a cost function for predicting next year's maintenance cost. The maintenance department head has suggested these three possible cost drivers: machine setups, labor hours, or machine hours. Include a detailed explanation of how you would determine the best cost driver among these three.
   b. You have developed the cost function and used it to develop part of next year's budget. During the first few months of the year, you find that the estimate is off by several thousand dollars. Provide reasons why this could occur.

5. Jackalope Ski Company manufactures snow skis in a highly automated assembly plant in Jackson Hole, Wyoming. The automated system is in its first year of operation, and management is still unsure of the best way to estimate the overhead costs of operation for budgetary purposes. The following cost and potential cost driver data were collected for the first six months of operations:

Month	Machine Hours	Total Overhead
January	4,560	$276,000
February	4,380	$273,600
March	4,680	$278,400
April	3,960	$270,000
May	3,900	$252,000
June	3,720	$240,000

   a. Compute a cost function using machine hours under the high-low method.
   b. Discuss how each of the following is likely to affect the quality of the cost functions you estimated in part (a). Do not perform any calculations.
      1) Use of the high-low method
      2) Newness of the automated system

6. (Appendix 2A) Here are the results using regression analysis on maintenance and repair costs for the production machines in a manufacturing company. Two cost drivers were chosen: number of machine setups (X1) and machine hours (X2).

Variable	Coefficient	t-statistic	p-value
intercept	70,324.15	2.81	$p<0.01$
X1	14.83	2.39	$p<0.05$
X2	2.07	2.24	$p<0.05$

Adjusted R-square = 0.87

a. Write an equation for total cost based upon the regression analysis.
b. What does the Adjusted R-square tell you about the quality of information that would be produced using this cost driver? Explain.
c. Is it economically plausible that number of setups and machine hours could drive the costs of the maintenance and repair for the machines? Explain.

7. Elliott is the vice-president of marketing for NYP Corporation. He has called upon you, a member of the accounting staff, to help him forecast future sales. A regression analysis, with sales as the dependent variable and number of credit clients as the independent variable, yielded the following results:

Variable	Coefficient	t-statistic	p-value	
Intercept	6911.45	3.45	0.01	
Number of clients		1157.88	3.75	0.01

Adjusted R-square = 0.85

a. Write out the revenue function for this regression.
c. Identify two uncertainties associated with using the number of clients to predict sales.

8. Managers might estimate a cost function for a variety of reasons including: budgeting, setting employee work schedules, or discontinuing a line of business. Consider the problem of predicting the future cost of fuel for a company's fleet of automobiles.

a. Identify three factors that might influence the actual future cost of fuel.
b. Identify and explain two potential cost drivers for the cost of fuel.
c. Suppose actual fuel costs turn out to be higher than estimated cost. Would this mean that an inappropriate estimation method was used? Explain.

9. Coffee Cart sells a variety of hot and cold coffee beverages. Data for a recent month appear below:

Revenue		$20,000
Costs:		
Ingredients	$7,800	
Miscellaneous supplies (napkins, etc.)	1,200	
Rent	1,000	
Wages for part time employees	3,000	
Cart attendant salary	5,000	
Total costs		18,000
Profit		$ 2,000

Part time employees are scheduled for busy times, but are sent home as soon as volumes drop enough to warrant it.

a. Categorize each cost as fixed or variable and explain your choice.
b. Create a cost function.
c. Discuss three reasons why the cost function you estimated in part (b) might provide an inaccurate estimate for next month's costs.

Answers

True / False

1. T
2. T
3. F
4. F
6. F
7. F
85. F
96. T
107. F
118. F
189. F
1910. T
112.T
132. F
136. F
174. T
145.F
165. T
2117. F
1822. F
1923. T
16. F
17. T
18. F
19. T
20. T
21. F
22. F
23. T
214. TF
252. T
236. T

Multiple Choice

1. B
2. A
3. A
4. A
5. B
6. B
7. C
8. A
9. A.
10. B
11. B
12. D
13. B
2114. B
14.D *$126,000 * 2^0.152*
15. D *$75,000 * 2^0.234 = $63,770*
16. C *4.8 hours = 6 hours*2^0.322*
17. A *8.1 = 10 hours*4^0.152*
18. B
19. C
20. B *3 * 5^0.234*
21. B
2215. D
2316. C
2417. B
2518. B
2619. D
2720. C
2821. D
2922. D
3023. C
3124. D *($1,500-$900)/(7,000-4,000)*
3225. C *VC=$0.20 per question #31; $900-(4,000×$0.20)*
3326. A *See questions #31 & #32*
3427. B *($7,085-$4,585)/(5,900-3,400)*
3528. A *VC=$1.00 per question #34; $7,085-(5,900×$1)*
3629. C *$1,185+(4,500×$1)*
3730. C *3,500×$10.50=$36,750; 3,000×$11.25=$33,750; ($36,750-$33,750)/(3,500-3,000)*
3831. A *VC=$6 per question #37; $36,750-(3,500×$6)*
3932. D
4033. D
4134. C
4235. A
4336. C
4437. A
4538. A
4639. D
4740. C
4841. D
4942. D
5043. B *$130,000 + ($5 * 26,000)*
5144. D
5245. C
5346. A
5447. A
5548. A
5649. B
5750. A
5851. A
5952. B
6053. A
6154. A
6255. C
6356. D

~~64~~57. B
~~65~~58. C
~~66~~59. C
~~67. B~~
~~68~~60. B
~~69~~61. A
~~70~~62. C
~~71~~63. B
~~72~~64. A
~~73~~65. C
~~74~~66. D *3,100 × 80% × ($12.50 - $7.50)*
[S]75. A
[S]76. B
[S]77. D
[S]78. C
[S]79. D
[S]80. C
[S]81. C
[S]82. A
[S]83. D
[S]84. B
[S]85. A *85% times 200 hours*
[S]86. C
[S]87. D
[S]88. D
[S]89. C
[S]90. D *Total costs = $178,024 + ($12.30/units) x (1000 units sold)*
[W]91. B
[W]92. A
[W]93. D
[W]94. A
[W]95. C
[W]96. A
[W]97. B
[W]98. D
[W]99. A
[W]100. B
[W]101. C
[W]102. A
[W]103. D
[W]104. D
[W]105. A
[W]106. B
[W]107. A

Matching

1. Cost classification

1.	D	5.	D	9.	D
2.	B	6.	D	10.	A
3.	B	7.	A		
4.	D	8.	B		

2. Matching

1.	C	5.	D	9.	G
2.	A	6.	A	10.	H
3.	B	7.	I	11.	B
4.	L	8.	E	12.	K

3. Regression analysis steps

8	Write the cost function.
4	Plot the cost for each potential cost driver.
5	Perform the regression analysis.
2	Generate a list of possible cost drivers.
3	Gather data.
6	Evaluate the sign and significance of the cost function's components.
7	Discard potential cost drivers that fail to explain a high proportion of variability in the cost.
1	Consider the behavior of the cost.

Exercises

1. Two-point method:

Units	Cost per unit	Total cost
300	$ 61	$ 18,300
200	82	16,400
100		$ 1,900
VC per unit	$ 19	***Part a***
Total FC	$ 12,600	***Part b***
Total cost of 250 units	$ 17,350	
Average unit cost for 250 units	$ 69.40	***Part c***

2. Total cost = $20,000 + $7,000/$28,000 x total revenue
   = $20,000 + 0.25 x total revenue
   Assumptions: Sales mix, price, and variable cost remain constant, fixed costs remain fixed, and operations are in the relevant range. (Note: The assumption of constant sales mix is not introduced until chapter 3 of the textbook.)

3. a. Total cost for 10,000 units = $880,000
   Total cost for 15,000 units = $1,260,000
   VC = ($1,260,000 - $880,000)/(15,000 – 10,000) = $76
   Fixed cost for 15,000 units = $1,260,000 - $1,140,000 = $120,000
   Total cost = $120,000 + $76Q.

   b. Total cost for 18,000 units = $1,488,000
   Average cost = $82.67

4. a. For production levels between 0 and 5,000 units, TC = $25,000 + $10Q
   For production levels above 5,000 units, TC = $25,000 + ($10 x 5,000) + $7.50(Q-5,000)
   TC = $37,500 + $7.50Q
   b. Often raw materials are discounted with volume purchases.
   c. Below are the three assumptions of this cost function, with examples of reasons why each assumption might not hold. Students may think of other examples.

   Fixed costs remain fixed. Utilities and other types of fixed cost vary each month, but often not based on volume of production. There can also be unanticipated price changes or changes in discretionary spending.

   Variable costs remain constant per unit. Volume discounts are often given, reducing variable costs after a certain level of purchases. There can also be unanticipated price changes.

   Operations are in the relevant range. At the extremes of the range, that is very high or very low production levels, costs might be a little different than within those areas of the range where the organization has most experience. In addition, the relevant may be misspecified; operation volumes may increase or decrease to a level of activity in a different relevant range; or managers may make changes to operations or the cost structure.

5. High-low method (Student answers may vary depending on rounding choices.)

Units	Total cost	
8,000	$ 1,000	
5,000	745	
3,000	$ 255	
VC per unit	$ 0.09	***Question A***
Total FC	$ 320.00	***Question B***
Estimated cost for 9,000 DLH	$ 1,085.00	***Question C***
Estimated cost for 6,000 DLH	$ 830.00	***Question D***

~~6. Learning curve~~

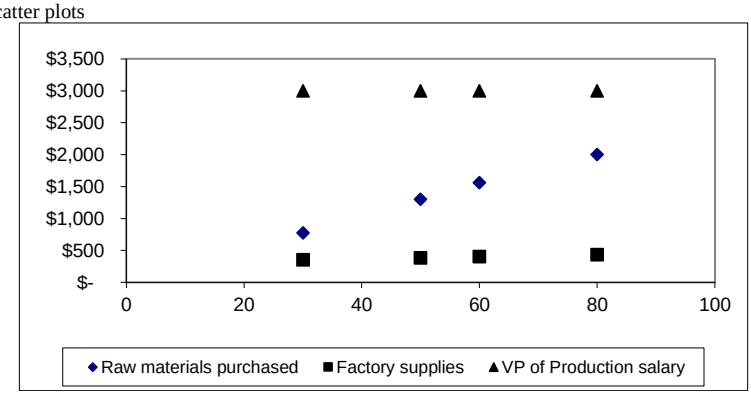
Average cost per unit to produce 100 units	$125,000 * $100^{0.152}$	$ 62,074
Total unit sales	60	
Units sold in 20x1	20	
Unit sales for 20x2	40	
~~Sales for the 9 months ended 9 / 30 / x2~~	$ 4,000,000	
COGS for the 9 months ended 9 / 30 / x2	(2,482,962)	
Gross profit for the 9 months ended 9 / 30 / x2	$ 6,482,962	

6~~7~~. Cost classification

	Fixed	Variable	Mixed
Oil to lubricate the machines		**X**	
Salary of the plant manager	**X**		
Annual subscription to a trade journal	**X**		
Vacation pay for salaried production employees	**X**		
Packaging materials		**X**	
Research and development	**X**		
Raw materials		**X**	
Material handling costs			**X**
Marketing department costs			**X**
Factory maintenance	**X**		

78. Cost estimation methods

a. Scatter plots



Description of cost behavior:

Cost of raw materials purchased is variable; total cost at zero volume appears to be zero, and the total cost appears to increase at a constant rate. The cost of raw materials most likely varies proportionately with the volume of production.

Cost of factory supplies is most likely mixed. Although the cost behavior is not visually obvious in the above scatter plot, the data for the cost indicate that the cost is higher at higher levels of production. Also, the cost appears to have a fixed component. Factory supplies often include a combination of fixed costs, such as janitorial supplies and light bulbs, and variable costs, such as lubrication for machinery.

Production manager salary is a fixed cost; it is constant across all levels of production. Production manager salaries usually do not vary with volume of production.

b. Two-point method analysis for factory supplies

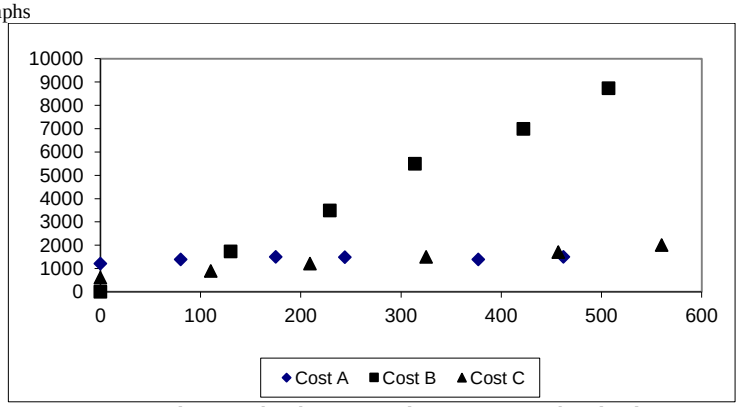
Units	Cost
80	430
50	380
30	50
VC per unit	$ 1.67
Total FC	$ 296.67
Cost function	$296.67 + $1.67 (# of units produced)

c. High-low method analysis for factory supplies

Units	Cost	
80		430
30		350
50		80
VC per unit	$	1.60
Total FC	$	302.00
Cost function	$302.00 + $1.60 x units produced	

89. Scatter plots

a. Graphs



Cost A varies in total amount, but the variation does not appear to be related to variation in volume of the cost driver. In addition, total cost is fairly high when volume of the cost driver is zero. It is most likely a fixed cost.

Cost B appears to vary proportionately with volume of the cost driver, and total cost is zero when volume of the cost driver is zero. It is most likely a variable cost.

Cost C appears to be higher for higher volumes of the cost driver, but total cost is not zero when volume of the cost driver is zero. It is most likely a mixed cost.

b. Here are possible examples of each cost; students may think of other examples.

Cost A could be utilities, which are a fixed cost but vary due to factors such as weather that are unrelated to a cost driver.

Cost B could be direct labor or direct materials costs, which are driven by production volume.

Cost C could be factory maintenance costs, which are not zero when activity is zero, but increases with volume production or with machine hours.

910. Learning curves

a. $10 * 6^{-0.152} = 7.6$ hours per page

b. $10 * 10^{-0.152} = 7.0$ hours per page

7.0 hours per page * 10 pages = 70 hours

10. a. Engineered cost estimates

Bananas	$1.00
Ice cream	0.20
Fruit toppings	1.50
Chocolate sauce	0.75
Miscellaneous	0.05
Total cost	$3.50

b. Here are several factors that could cause these estimated costs to be inaccurate; students will think of other factors. Employees could eat product, increasing costs. Any of the ingredient prices could change. Employees may not use the estimated portions, but include more or less of each ingredient. Consumer preferences could change so that no fruit toppings are used, or more chocolate sauce is requested.

11. Regression analysis
a. Number of purchase orders is the better independent variable, based on the higher Adjusted R-square statistic.
b. Total purchasing costs = $497.25 + $18.72 x number of purchase orders
c. $497.25 + $18.72 (340) = $6,862.05
d. Here are several uncertainties that could affect accuracy of the cost function; students will think of other uncertainties. Normal variations could occur in the amount of resources devoted to purchases orders issued. An unanticipated salary increase could take place for purchasing employees. A new employee could be hired who cannot keep up with the work, so a temporary worker is brought in until the new worker is trained.

12. NTQ Corporation
a. Costs can be determined in a variety of ways, depending upon the purpose of the calculation. In addition, because biases, uncertainties, and management judgments come into play in cost determination, there is no single "correct" way to calculate the cost of a compact disc.
b. The cost of a compact disc might change or vary because of:
Changes in raw material costs from bulk purchases, quality changes, or other factors
Degree of automation vs. labor employed in the production process
Changes in plant layout which reduce overhead costs
Changes in wage rates due to union negotiations and/or outsourcing jobs
Changes in type or cost of packaging materials
Changes in artists' royalties

13. Learning curves
a. A learning curve explains how costs and/or time can change as workers gain experience in performing a specific task, such as using computer software or building a bridge.
b. The learning curve rate might change or vary for several reasons, including: an incorrect initial estimate, a process being easier / more difficult to master than expected, workers "catching on" more quickly / more slowly than expected. External factors, such as documentation or conflicting priorities, may also impact a learning curve rate. Students may think of other reasons.

14. Regression is useful for estimating a cost function when fixed and variable costs are unknown. In this problem, the accountant already knows the cost function (TC = $100 + $0.02*Number of copies), so there is no need to estimate the cost function using regression or any other estimation technique.

15. a. TC = $40,000 + $20,000/$80,000 x total revenues = $40,000 + .25 x total revenues
b. Fixed costs remain fixed, variable costs remain constant, operations are in the relevant range and sales mix remains constant. (Note: The assumption of constant sales mix is not introduced until chapter 2 of the textbook.)
c. A cost function might provide poor estimates of future costs for the following reasons; students may think of others. The behavior of costs could change after a cost function is

developed. For example, the cost of direct and indirect materials could change, labor rates could change, or operations could move out of the relevant range. The cost function may be misspecified because inappropriate estimation techniques were used. For example, a stepwise linear cost function might have been inappropriately estimated using regression analysis, or the high-low method might have been applied to usually high or low (i.e., outlier) data points.

Short Answer

1. TC = F + V*Q. TC is total cost, that is, the total amount of cost that is being explained. F is fixed costs, which do not change with small changes in volumes of the cost driver. V is variable cost per unit of the cost driver, and that cost remains constant within the relevant range, but its total cost increases proportionately with increases in cost driver volumes. Q is the quantity of cost driver.

2. Assumptions:
   Fixed costs remain constant in total
   Variable costs remain constant per unit of the cost driver
   Operations in the relevant range

3. Students are asked to list only one assumption and to describe a circumstance in which that assumption will not hold. Below are examples of circumstances for all 3 assumptions; students will think of other circumstances.

   Fixed costs remain constant in total: Variable costs often decrease with volume because of discounts.
   Variable costs remain constant per unit of the cost driver: Fixed costs change because they include utilities and so vary with weather or other factors that are unrelated to production volumes.
   Operations in the relevant range: Business volumes might become unusually high or low due to changes in economic conditions, moving operations into a new relevant range.

4. Regression analysis is a mathematical technique that incorporates all of the observations of cost and cost driver. The high-low and two-point methods use only two data points for cost with their corresponding data points for volume. Because regression incorporates many more data points, the trend line developed is likely to be a more accurate representation of cost. In addition, regression output allows one to evaluate the goodness of fit for different cost drivers, and that information is lacking with the other two methods. The high-low method is a special case of the two-point method and uses only the highest and lowest points, which may not be representative of ordinary operations, so it is the least accurate of the three methods.

5. Below are examples of answers for this question; students will think of other pros and cons. Also see Exhibit 2.17.

   Analysis at the account level is an examination of the accounting records to determine whether costs are fixed or variable. An advantage is that information is in the accounting system and can be accessed without further effort. A disadvantage is that is does not reflect anticipated changes in cost that would improve the cost function.

   Engineering estimates of cost analyze the underlying activities and materials used to produce a good or service to develop the cost function. Engineering estimates can be very accurate because they consider current period resource use. However, it is time consuming and may overlook some fixed costs that need to be included in the cost function.

   Regression analysis uses past cost data and a statistical method to develop a cost function. It is often used in conjunction with the analysis at the account level to specify mixed costs. Regression

analysis provides the highest quality information, but it is more complex and requires knowledge of the spreadsheet program to perform. Students may have used the two-point method or high-low method as well.

6. When average cost decreases, the cost function includes at least some fixed costs. As the fixed costs are spread over more units, the average cost per unit decreases. The cost function may or may not include variable costs.

7. A scatter plot is used to increase understanding of cost behavior. For some data, scatter plots provide enough information so that the cost can be categorized. This would occur when the scatter plot shows that the cost is fixed, that is, either there is very little slope, or there is no apparent trend. However, if the scatter plot shows a trend line, then further analysis is needed to develop the cost function. This analysis could include regression or a two-point method.

8. Economic plausibility means that there is an economic explanation for the relationship. For example, the cost of gasoline increases as more miles are driven. It is economically plausible, then, that miles driven would be an appropriate cost driver for transportation costs. Alternatively, number of employees is unlikely to be economically related to transportation costs because we do not know if all of the employees drive the cars, or what the relationship is between employees and transportation. Number of employees is much less likely than miles driven to have an economically plausible relationship with cost of gasoline.

9. Using past cost information cannot completely eliminate the risk of errors in predicting future costs. Managers may be inexperienced or otherwise biased in their use and interpretation of past cost information. They may employ less-than-suitable cost estimation methods. Further, economic / human / production factors could change significantly, making past costs unrepresentative of future costs. Students may think of other factors.

10. Minh cannot know for certain whether the costs of direct materials and labor have changed since the cost estimates were developed. In addition, overhead costs may have changed. It is possible, although unlikely, that the method of estimating costs could have changed. In addition, the volume of production affects the average cost, and if this cost is an average, it is based on an estimate of production for the period, and the exact amount of production will not be known until the end of the period. Students may think of other reasons.

11. Cost estimation methods (students are required to identify only 3)

Analysis at the account level requires examination of accounting records and categorization of costs into fixed, variable, and mixed. Past costs are then used to predict future costs; however, the costs can easily be updated with expected input price changes.

The two point method requires a scatter plot of data, or at least two years' observations. From the data, two points that are representative of normal operations are chosen, the slope (variable cost) is calculated, and then fixed cost is found.

The high-low method is a specific type of the two-point method in which the highest and lowest data points are chosen for the slope and intercept calculations.

Engineered estimates require an analysis of the underlying use of resources (direct materials and direct labor) to predict future costs.

Regression analysis is usually used with the analysis at the account level method, specifically for those costs that are not definitely identified as fixed or variable. This method uses many data points to fit a trend line with a mathematical calculation that minimizes the squared error of each observation.

Problems

1. a. TC = $7,128 + $241 × number of academic programs.
   TC = $3.78 x number of students. (T-statistic on the coefficient reflecting fixed costs (intercept) is not statistically significant, so we assume fixed cost is zero.)
   b. The R-square statistic is the highest for number of academic programs, so the cost function using its data would be the most accurate.
   c. Costs normally vary due to unpredictable changes in costs. For example, overhead costs probably include the costs of heating and cooling, which change with weather and utility rates, rather than with programs or students. In addition, historical cost information about university overhead may not be appropriate for predicting future costs. There is a high proportion of fixed costs that probably change over time, such as professors' salaries, staff, and clerical salaries. In addition, universities sometimes have budget cut-backs, and professor and staff levels may be reduced. The regression analysis does not take these into consideration. Students will have thought of others.

2. a. TC = $2,222 (Coefficient reflecting variable cost (slope) is statistically insignificant, so we set it at zero.)
   b. This cost driver, volume of units sold, does not explain very much of the variation in marketing department cost. The R-square is low at 0.40, suggesting that sales volumes only explains about 40% of the variation in cost. This cost function does a poor job of explaining past costs, and it is likely to perform even less well in estimating future costs.
   c. If there are sales commissions as part of the cost, then sales volumes would be a good cost driver for that portion of marketing costs. However, the problem does not specify whether this is a discretionary cost. Often marketing costs are discretionary costs.
   d. If the marketing department buys a lot of advertising, the number of ads or the number of times ads are run could be used as a cost driver. If the marketing department has a lot of employees and they are salaried, the number of employees could drive costs. Students will think of other potential cost drivers.
   e. Discretionary costs are decisions about the amount of cost to incur, and these are often made on an annual basis.
   f. Yes, marketing costs could be discretionary. These costs are usually set according to a budget, but can be cut back or increased in the middle of an accounting period. When profits are higher, it is likely that more is spent on marketing.
   g. Because discretionary costs are set by decision, accountants consult the decision makers and ask for an estimate of the cost for the next period.

3. a. Nurses' salaries and administration are two fixed costs. We use the most current month's value to predict next month's fixed cost. Therefore fixed costs are $170,000 ($120,000 + $50,000). Vaccine and syringes must be a variable cost because $60,000/12,000 = $5, and $80,000/16,000 = $5. It is logical to assume that vaccines and syringes would vary with the number of visits because many patients probably get vaccinations. Miscellaneous supplies are probably mixed because although the cost increases, it does not increase proportionately with volumes. Supplies probably include things like lab coats and computer related supplies that do not vary with patient volumes.
   b. VC = $22,000 - $19,000/16,000 – 12,000 = $3,000/4,000 = 0.75
   Fixed costs: $22,000 = F + 0.75 x 16,000 ➔ F = $10,000
   c. TC = ($120,000 + $50,000 + $10,000) + $5.75 x Q
   d. Total cost for 18,000 patients = $180,000 + $5.75 x 18,000 = $283,500
   e. Managers cannot know for certain the number of patients that will visit the clinic because they cannot know when a contagious illness will cause more children to become vaccinated. In addition, the birth rate could change. Costs change over time, and sometimes they change unexpectedly. For example, nurses' salaries increase more rapidly when there is a shortage of nurses. Students will think of factors that could affect patient volumes.

4. a. To develop a cost function, I first consider whether past costs would be relevant in predicting future costs. If there have been no major changes in the production line or technology, past costs are a good place to start. Next I pick those costs that are relevant to maintenance from the accounting records. This is not a discretionary cost, we incur it as part of operations, so I can use past information to develop a cost function to predict future costs, but I need to determine whether any changes in costs are expected. Then I can use these records and one of the techniques for estimating past costs, such as analysis at the account level. This could be a mixed cost, so I would also plot the cost against the three potential cost drivers. If a linear trend is apparent with one or more of these cost drivers, I would use regression analysis to determine whether one cost driver appears to be more accurate than the others. First I examine R-square and determine the cost driver that best explains the variation in cost. If none of the drivers have R-squares above about 70%, I may need to identify alternative drivers or consider whether the cost might be primarily fixed. If one cost driver has an R-square about or above 70%, I would analyze the t-statistics and p-values to determine the cost function.

   b. Many different factors can cause costs to be different than estimated. Below are some factors; students will think of others. It is impossible to perfectly predict future costs because the costs might change, production levels might vary, or other factors could alter the fixed or variable costs. For example, unanticipated volume discounts might be received. Operations could be more or less efficient than estimated because workers provide more or less effort. In addition, the cost function might be poorly estimated.

5. a. Cost function for machine hours:
   Variable cost = ($278,400 - $240,000)/(4,680 – 3,720) = $40
   Fixed cost = $91,200
   TC = $91,200 + $40 * machine hours

   b. 1) The high-low method generally reduces the quality of a cost function estimate because it uses only the highest and lowest values of the cost driver. These values may be atypical, resulting in a distorted cost function.

   2) The cost and production data for this problem are from the first 6 months of operations with a new production system. When companies install new production systems, it often takes some time before costs and production activities stabilize. Therefore, the data in this problem might have low quality for estimating future costs. The quality of data depends on the nature of the production system, how quickly employees learn to use it, and whether engineers continue to make changes in the system as greater production experience is gained.

6. a. TC = $70,324 + $14.83*number of setups + $2.07*machine hours.

   b. The R-square provides information about how well the variation in the cost drivers explains variations in cost. In this problem, the R-square is relatively high, so changes in the two drivers explain about 87% of the changes in cost.

   c. Both cost drivers are economically plausible. Some labor and supplies are needed when each new setup occurs, so maintenance costs would increase with number of setups. As machine hours increase, more repairs and oil and routine maintenance is needed, so these seem like they could cause variations in cost.

7. a. Revenue = $6,911 + $1,158 x number of clients

   b. Here are some uncertainties associated with using the number of clients to predict sales; students will think of others. The average amount of revenue per client may change over time due to economic factors, competition, and customer preferences. The regression explains only 85% of the variation is past revenue, so it cannot be expected to predict future revenue perfectly.

8. a. Here are several factors related to the cost of fuel; students may think of others.
   Type of vehicle

Distance and / or speed driven
Preventive maintenance schedules
Price of fuel
Driving conditions

b. Here are several possible cost drivers; students may think of others.
Number of miles driven
Type of fuel: diesel, regular unleaded, premium unleaded
Geographic location of fuel purchase: domestic, international

c. The purpose of this question is to determine whether students understand that deviations from cost estimates can arise from factors *other than* use of an inappropriate estimation method. When predicting costs for the future, it is unlikely that actual costs are the same as the prediction. Changes in the costs and volumes of production affect the cost function. In addition, there may be changes in vehicle technology that affect efficiency, and costs could decrease. Student responses will vary.

9. a. Ingredients are variable because we use them as we sell product.
Miscellaneous supplies are also variable
Rent is fixed
Wages for part time employees are variable
Store attendant salary is fixed.

b. TC = ($1,000 + $5,000) + ($7,800 + $1,200 + $3,000)/$20,000 x total revenues
= $6,000 + 0.60 x total revenues

c. There are many possible reasons why the cost function might provide an inaccurate estimate. Here are several possible reasons; students may think of others:

- Cost behavior may have been misclassified when creating the cost function
- Revenue might be an inappropriate cost driver for one or more of the variable costs
- Fixed costs might change from the prior month. For example, the cart attendant's salary might be increased or a new rental agreement might be negotiated.
- Variable costs per dollar of revenue might change from the prior month. For example, the company might negotiate a lower cost for supplies such as napkins, or ingredient costs might fluctuate with food commodity prices.
- The cost function was estimated using only one month's data, which might not be representative of the activities and costs for other months.