PROBLEM 2–22 High-Low and Scattergraph Analysis [LO2–4, LO2–5]

Pleasant View Hospital of British Columbia has just hired a new chief administrator who is anxious to employ sound management and planning techniques in the business affairs of the hospital. Accordingly, she has directed her assistant to summarize the cost structure of the various departments so that data will be available for planning purposes.

The assistant is unsure how to classify the utilities costs in the Radiology Department because these costs do not exhibit either strictly variable or fixed cost behavior. Utilities costs are very high in the department due to a CAT scanner that draws a large amount of power and is kept running at all times. The scanner can't be turned off due to the long warm-up period required for its use. When the scanner is used to scan a patient, it consumes an additional burst of power. The assistant has accumulated the following data on utilities costs and use of the scanner since the first of the year.

Month	Number of Scans	Utilities Cost
January	60	$2,200
February	70	$2,600
March	90	$2,900
April	120	$3,300
May	100	$3,000
June	130	$3,600
July	150	$4,000
August	140	$3,600
September	110	$3,100
October	80	$2,500

The chief administrator has informed her assistant that the utilities cost is probably a mixed cost that will have to be broken down into its variable and fixed cost elements by use of a scattergraph. The assistant feels, however, that if an analysis of this type is necessary, then the high-low method should be used, since it is easier and quicker. The controller has suggested that there may be a better approach.

Required:

1. Using the high-low method, estimate a cost formula for utilities. Express the formula in the form $Y = a + bX$. (The variable rate should be stated in terms of cost per scan.)
2. Prepare a scattergraph by plotting the number of scans and utility cost on a graph. Draw a straight line though the two data points that correspond to the high and low levels of activity. Make sure your line intersects the Y-axis.
3. Comment on the accuracy of your high-low estimates assuming a least-squares regression analysis estimated the total fixed costs to be $1,170.90 per month and the variable cost to be $18.18 per scan. How would the straight line that you drew in requirement 2 differ from a straight line that minimizes the sum of the squared errors?

Problem 2-22 (45 minutes)

1. High-low method:

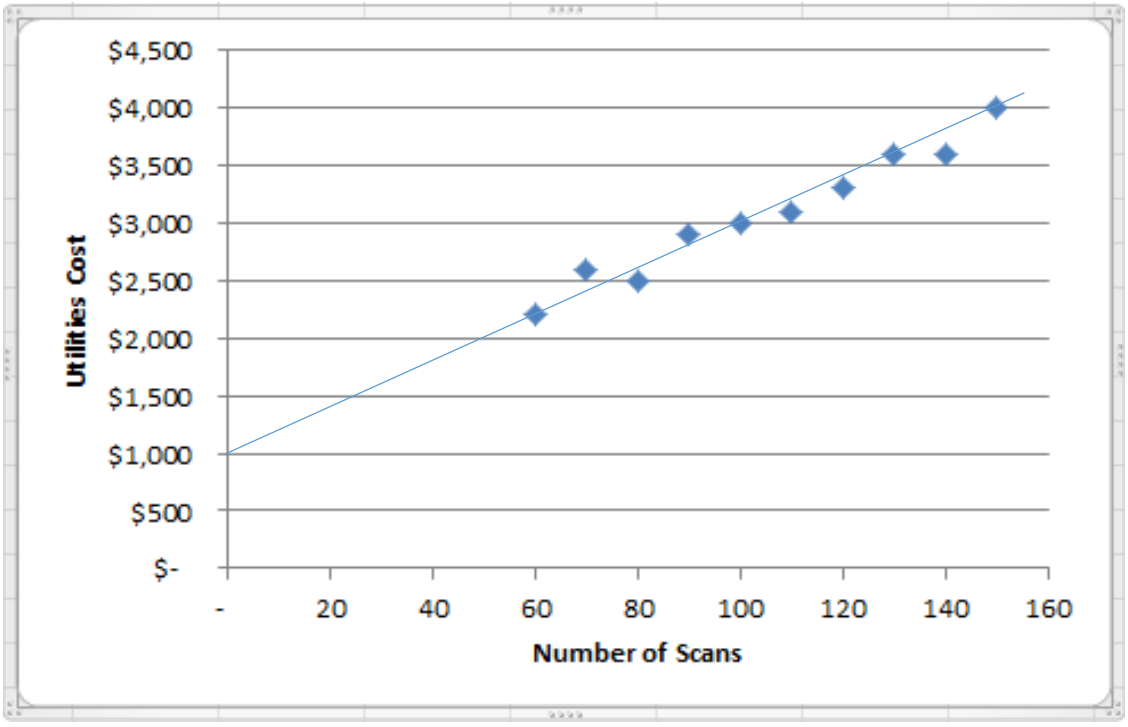
	Number of Scans	*Utilities Cost*
High level of activity .	150	$4,000
Low level of activity ..	60	2,200
Change	90	$1,800

$$\text{Variable rate: } \frac{\text{Change in cost}}{\text{Change in activity}} = \frac{\$1{,}800}{90 \text{ scans}} = \$20 \text{ per scan}$$

Fixed cost:	Total cost at high level of activity	$4,000
	Less variable element:	
	150 scans × $20 per scan	3,000
	Fixed cost element	$1,000

Therefore, the cost formula is: Y = $1,000 + $20X.

2. The scattergraph plot appears as follows:



Problem 2-22 (continued)

3. The high-low estimate of fixed costs is $170.90 lower than the estimate provided by least-squares regression. The high-low estimate of the variable cost per unit is $1.82 higher than the estimate provided by least-squares regression. A straight line that minimized the sum of the squared errors would intersect the Y-axis at $1,170.90 instead of $1,000. It would also have a flatter slope because the estimated variable cost per unit is lower than the high-low method.