CHAPTER 7 SOLUTIONS

Exercise 7-24 (15 minutes)

1.  

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>July</th>
<th>September</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production crew:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$4,875/390 hr.</td>
<td>$12.50 per hr.</td>
<td></td>
</tr>
<tr>
<td>$8,000/640 hr.</td>
<td>$12.50 per hr.</td>
<td></td>
</tr>
<tr>
<td>Supervisory employees:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$5,000/390 hr.</td>
<td>12.82 per hr.*</td>
<td></td>
</tr>
<tr>
<td>$5,000/640 hr.</td>
<td>7.81 per hr.*</td>
<td></td>
</tr>
</tbody>
</table>

*Rounded.

2.  December cost predictions:

- Production crew $(420 \times $12.50 \text{ per hr.})$ .............................................. $5,250
- Supervisory employees ................................................................. 5,000

3.  

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Cost per Broadcast Hour in December</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production crew</td>
<td>$12.50 per hr.</td>
</tr>
<tr>
<td>Supervisory employees ($5,000/420 hr.)</td>
<td>11.90 per hr.*</td>
</tr>
</tbody>
</table>

*Rounded.

Exercise 7-30 (15 minutes)

1.  Variable maintenance

$$\text{cost per tour mile} = \frac{(12,500r-11,000r)}{20,000 \text{ miles} - 8,000 \text{ miles}} = .125r$$

$r$ denotes the real, Brazil’s national currency.

Total maintenance cost at 8,000 miles .............................................. 11,000$r$
Variable maintenance cost at 8,000 miles $(.125r \times 8,000)$ ....................... 1,000$r$
2. Cost formula:

Total maintenance cost per month = 10,000r + .125rX, where X denotes tour miles traveled during the month.

3. Cost prediction at the 22,000-mile activity level:

Maintenance cost = 10,000r + (.125r)(22,000)
= 12,750r

Exercise 7-34 (45 minutes)

1. Variable utility cost per hour = \( \frac{1,900 - 1,300}{700 - 400} \) = $2.00

Total utility cost at 700 hours ................................................................. $ 1,900
Variable utility cost at 700 hours ($2.00 × 700 hours) ......................... 1,400
Fixed cost per month ................................................................................ $ 500

Cost formula:

Monthly utility cost = $500 + $2.00 X, where X denotes hours of operation.

2. Variable-cost estimate based on the scatter diagram on the next page:

<table>
<thead>
<tr>
<th>Cost at 600 hours</th>
<th>.................................................................</th>
<th>$1,700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost at 0 hours</td>
<td>.................................................................</td>
<td>450</td>
</tr>
<tr>
<td>Difference 600 hours</td>
<td>.....................................................................</td>
<td>$1,250</td>
</tr>
</tbody>
</table>

Variable cost per hour = $1,250/600 hr. = $2.08 (rounded)
Exercise 7-34 (Continued)

Scatter diagram and visually-fitted line:

- Utility cost per month
- Hours of operation
- Points plotted at various utility costs and corresponding hours of operation.
Exercise 7-34 (Continued)

3. Least-square regression:

(a) Tabulation of data:

<table>
<thead>
<tr>
<th>Month</th>
<th>Dependent Variable (cost)</th>
<th>Independent Variable (hours)</th>
<th>X^2</th>
<th>XY</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1,620</td>
<td>550</td>
<td>302,500</td>
<td>891,000</td>
</tr>
<tr>
<td>February</td>
<td>1,700</td>
<td>600</td>
<td>360,000</td>
<td>1,020,000</td>
</tr>
<tr>
<td>March</td>
<td>1,900</td>
<td>700</td>
<td>490,000</td>
<td>1,330,000</td>
</tr>
<tr>
<td>April</td>
<td>1,600</td>
<td>500</td>
<td>250,000</td>
<td>800,000</td>
</tr>
<tr>
<td>May</td>
<td>1,350</td>
<td>450</td>
<td>202,500</td>
<td>607,500</td>
</tr>
<tr>
<td>June</td>
<td>1,300</td>
<td>400</td>
<td>160,000</td>
<td>520,000</td>
</tr>
<tr>
<td>Total</td>
<td>9,470</td>
<td>3,200</td>
<td>1,765,000</td>
<td>5,168,500</td>
</tr>
</tbody>
</table>

(b) Calculation of parameters:

\[
a = \frac{(\sum Y)(\sum X^2) - (\sum X)(\sum XY)}{n(\sum X^2) - (\sum X)(\sum X)}
\]

\[
= \frac{(9,470)(1,765,000) - (3,200)(5,168,500)}{(6)(1,765,000) - (3,200)(3,200)} = 501
\]

\[
b = \frac{n(\sum XY) - (\sum X)(\sum Y)}{n(\sum X^2) - (\sum X)(\sum X)}
\]

\[
= \frac{(6)(5,168,500) - (3,200)(9,470)}{(6)(1,765,000) - (3,200)(3,200)} = 2.02
\]

(c) Cost formula:

Monthly utility cost \( = $501 + 2.02X \), where \( X \) denotes hours of operation.

Variable utility cost \( = 2.02 \) per hour of operation
exercise 7-34 (continued)

4. Cost predictions at 300 hours of operation:

(a) High-low method:

\[
\text{Utility cost} = 500 + (2.00)(300) = 1,100
\]

(b) Visually-fitted line:

\[
\text{Utility cost} = 1,095
\]

This cost prediction was simply read directly from the visually-fitted cost line. This prediction will vary because of variations in the visually-fitted lines.

(c) Regression:

\[
\text{Utility cost} = 501 + (2.02)(300) = 1,107
\]