

**Answers to Problems**

1. Productivity = output/input

$$\begin{aligned} \text{Labor Productivity} &= \frac{\$200,000 \text{ billings}}{\$40,000 \text{ salary \& fringe benefits}} \\ &= \$5.00 \text{ billings/\$1 salary} \end{aligned}$$

3.

$$\begin{aligned} \text{Company's productivity} &= \frac{\$3,750,000}{\$1,500,000 + \$1,275,000 + \$750,000} \\ &= \$1.064 \text{ sales/\$1 labor, capital \& material} \end{aligned}$$

5. Productivity of labor and capital =

|                           | Two Years ago  | Last Year  | % Change in productivity                      |
|---------------------------|--|--|---|
| Labor Productivity        | $\frac{\$1,365,000}{\$870,000}$<br>= 1.569             | $\frac{\$1,425,000}{\$375,000}$<br>= 3.8               | $= (3.8 - 1.569) / 1.569 (100)$<br>= 142.2%   |
| Capital Productivity      | $\frac{\$1,365,000}{\$160,000}$<br>= 8.53              | $\frac{\$1,425,000}{\$924,000}$<br>= 1.54              | $= (1.54 - 8.53) / 8.53 (100)$<br>= -81.9%    |
| Multi Factor Productivity | $\frac{\$1,365,000}{\$870,000 + \$160,000}$<br>= 1.325 | $\frac{\$1,425,000}{\$375,000 + \$924,000}$<br>= 1.097 | $= (1.097 - 1.325) / 1.325 (100)$<br>= -17.2% |

Labor productivity increased dramatically from \$1.569 of output per dollar of labor two years ago to \$3.8 of output per dollar of labor last year. This represents a 142.2% increase in labor productivity. However, this was offset by a decrease in the productivity of capital, which declined by 81.9%, because of the significant capital investment. Overall, productivity declined by 17.2%.

7.

$$\begin{aligned} \text{Multiple Factor Productivity (Last Year)} &= \frac{(2,000 \text{ units})(\$40.00/\text{unit})}{(600)(\$18) + (100)(\$0.60) + 20,000 + (6,000)(\$0.50)} \\ &= \frac{\$80,000}{\$33,860} \\ &= \$2.36 \text{ sales/\$1 input costs} \end{aligned}$$

$$\text{Multiple Factor Productivity} = \frac{(2,150 \text{ units})(\$40.00/\text{unit})}{\text{-----}}$$

$$\begin{aligned}
 & \text{(This Year)} && (550)(\$18) + (90)(\$ .60) + 23,000 + (5,700)(\$ .50) \\
 & && \$86,000 \\
 & && = \text{-----} \\
 & && \$35,804 \\
 & && = \$2.40 \text{ sales}/\$1 \text{ input costs}
 \end{aligned}$$

$$\begin{aligned}
 \text{Change in overall productivity} &= (2.40 - 2.36)/2.36(100) \\
 &= 1.69\%
 \end{aligned}$$

9. a. The sum of all input costs for Last Year = \$48,000, and the sum of all input costs for This Year = \$57,000.

| Productivity | Last Year                                  | This Year                                   | Change (Percent)                               |
|--------------|--|---|--|
| Labor        | $\frac{(3,750)(\$55)}{\$3,000}$<br>= 68.75 | $\frac{(4,500)(\$60)}{\$3,200}$<br>= 84.375 | $= (84.375 - 68.75) / 68.75(100)$<br>= 22.7%   |
| Management   | $\frac{(3,750)(55)}{\$25,000}$<br>= 8.25   | $\frac{(4,500)(60)}{\$28,000}$<br>= 9.64    | $= (9.64 - 8.25) / 8.25(100)$<br>= 16.8%       |
| Computer     | $\frac{(3,750)(55)}{\$15,000}$<br>= 13.75  | $\frac{(4,500)(60)}{\$20,000}$<br>= 13.5    | $= (13.5 - 13.75) / 13.75(100)$<br>= -1.81%    |
| Office Space | $\frac{(3,750)(55)}{\$2,000}$<br>= 103.13  | $\frac{(4,500)(60)}{\$2,200}$<br>= 122.73   | $= (122.73 - 103.13) / 103.13(100)$<br>= 19.0% |
| Supplies     | $\frac{(3,750)(55)}{\$3,000}$<br>= 68.75   | $\frac{(4,500)(60)}{\$3,600}$<br>= 75.0     | $= (75.0 - 68.75) / 68.75(100)$<br>= 9.09%     |
| Overall      | $\frac{(3,750)(55)}{\$48,000}$<br>= 4.30   | $\frac{(4,500)(60)}{\$57,000}$<br>= 4.74    | $= (4.74 - 4.30) / 4.30(100)$<br>= 10.2%       |

b. An examination of the productivity for individual input factors shows that computer technology declined, but productivity for the other factors increased. This indicates that additional investment in computer technology may have caused an increase in overall productivity.

c. Many things could be done to further improve productivity, including investments in information technology, additional training for employees, and reducing staff overhead.