

Section 5.4 (cont.)

3) The rate of change of the length of the average hospital stay between 1980 and 1996 can be modeled by the equation

$$s(t) = \begin{cases} 0.028t - 0.23 \text{ days per year when } 0 \leq t < 10 \\ -0.0408t + 0.30833 \text{ days per year when } 10 \leq t \leq 16 \end{cases}$$

where t is the number of years

since 1980. Determine the values of the following definite integrals and interpret your answers.

a) $\int_0^{10} s(t) dt$

b) $\int_{10}^{16} s(t) dt$

c) $\int_0^{16} s(t) dt$

4) Many businesses spend money each year on advertising in order to stimulate sales of their products. The data given in the table show the approximate increase in sales (in thousands of dollars) that an additional \$100 spent on advertising, at various levels, can be expected to generate.

- a) Find a model for these data.
- b) Use the model in part *a* to determine a model for the total sales revenue as a function of the amount x spent on advertising. Use the fact that revenue is 500 thousand dollars when \$1000 is spent on advertising.
- c) Find the point where returns begin to diminish for sales revenue.
- d) The managers of the business are considering an increase in advertising expenditures from the current level of \$3500 to \$4800. What effect could this decision have on sales revenue?

Advertising expenditures (hundreds of dollars)	Revenue increase due to an extra \$100 advertising (thousands of dollars)
10	3
20	40
30	68
40	100
50	120
60	135
70	145

Section 5.5

1. The number of consumer complaints to the U.S. Department of Transportation about baggage on U.S. airlines between 1989 and 2000 can be modeled by the function

$$B(x) = 55.15x^2 - 524.09x + 1768.65 \text{ complaints where } x \text{ is the number of years after 1989.}$$

(Source: Based on data from *Statistical Abstract*, 2001.)

- a) Find the average number of baggage complaints during the period between 1990 and 1996.
- b) Sketch the graph of B from 1990 to 1996 and draw the horizontal line representing the average value.
- c) In which year was the number of complaints closest to the average value found in part (a)?
- d) Find the average rate of change of baggage complaints between 1990 and 1996.