

### Section 3.2

- 1) Vermont Instruments makes two kind of calculators, the VI-83 and the VI-86. The number of VI-83s sold each year is given by  $d(x) = 12,376\sqrt{x}$  calculators  $x$  years after 1990. The number of VI-86s sold each year is given by  $i(x) = 3972x$  calculators  $x$  years after 1990.
- Write a formula for the total number of calculators sold by Vermont Instruments  $x$  years after 1990.
  - Write the formula for the rate of change of the total number of calculators sold.
  - How many total calculators were sold in 2002?
  - How rapidly were calculators selling in 2002? Interpret your answer.
- 2) Total federal government expenditures (in billions of dollars) of the United States for the years 1991 to 1998 can be modeled by  $y = 9.67x - 17,890.89$  billion dollars in year  $x$ .
- Were total federal government expenditures increasing or decreasing during the time period modeled by the equation?
  - How rapidly were total federal government expenditures changing in 1997?
  - What was the average rate of change of total federal government expenditures between 1995 and 1997?

### Section 3.3

- 1) The percentage of mothers who returned to the work force within one year after they had a child for the years 1976 through 1998 can be modeled by  $P(t) = 36.025 + 6.27\ln t$  percent  $t$  years after 1977. (Source: Based on data from the Associated Press)
- What percentage of mothers returned to the work force within one year in 1998 and how rapidly was that percentage changing in 1998?
  - How rapidly on average did the percentage change from 1980 to 1990?
  - What happens to the rate at which the percentage is growing as more years go by?

### Section 3.4

- 1) Suppose that gas costs \$1.20 per gallon and that we are using gas at a rate of 3 gallons per minute. What is the rate of change of cost with respect to time, in dollars per minute?
- 2) A part-time office worker assembles portfolios and is paid according to the number of portfolios he assembles. Let  $S(p) = 1.5p$  be his salary (in dollars) when he assembles  $p$  portfolios. Let  $p(t) = 5t^2$  be the number of portfolios he has assembled  $t$  hours after his work day has begun. Identify the following values after he has worked two hours, and write a sentence interpreting each value.

- a)  $P(t)$       b)  $S(p)$       c)  $\frac{dp}{dt}$       d)  $\frac{dS}{dp}$       e)  $\frac{dS}{dt}$