2.4 Interpretations of the Derivative

Name: Date:

P 3. The temperature, T, in degrees Fahrenheit, of a cold yam placed in a hot oven is given by $T = f(t)$, where t is the time in minutes since the yam was put in the oven.

(a) What is the sign of $f'(t)$? Why?

(b) What are the units of $f'(20)$? What is the practical meaning of the statement $f'(20) = 2$?

P 10. After investing \$1000 at an annual interest rate of 7% compounded continuously for t years, your balance is \$ B, where $B = f(t)$. What are the units of dB/dt? What is the financial interpretation of dB/dt?

P 15. A city grew in population throughout the 1980s and into the early 1990s. The population was at its largest in 1995, and then shrank until 2010. Let $P = f(t)$ represent the population of the city t years since 1980. Sketch graphs of $f(t)$ and $f'(t)$, labeling the units on the axes.

P 27. Let W be the amount of water, in gallons, in a bathtub at time t, in minutes.

(a) What are the meaning and units of dW/dt?

(b) Suppose the bathtub is full of water at time t_0, so that $W(t_0) > 0$. Subsequently, at time $t_p > t_0$, the plug is pulled. Is dW/dt positive, negative, or zero:

(i) For $t_0 < t < t_p$?

(ii) After the plug is pulled, but before the tub is empty?

(iii) When all the water has drained from the tub?

P 40. Is the statement true or false? Give an explanation for your answer.
" If $f(t)$ is the quantity in grams of a chemical produced after t minutes and $g(t)$ is the same quantity in kilograms, then $f'(t) = 1000g'(t)$."

P 42. Assume $g(v)$ is the fuel efficiency, in miles per gallon, of a car going at a speed of v miles per hour. What are the units of $g'(v) = \dfrac{dg}{dv}$? There my be more than one option.

(a) $(\text{miles})^2/(\text{gal})(\text{hour})$

(b) hour/gal

(c) gal/hour

(d) $(\text{gal})(\text{hour})/(\text{miles})^2$

(e) (miles/gallon)/(miles/hour)