Homework 3

§2.4#3, 5, 7, 9, 21, **4***, **18**, **22**

§2.4 #3. The temperature, T, in degrees Fahrenheit, of a cold yam placed in a hot oven is given by $T = f(t)$, whete 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 $f'(20) = 2$?

§2.4 #5. The cost, C (in dollars), to produce q quarts of ice cream is $C = f(q)$. In each of the following statements, what are the units of the two numbers? In words, what does each statement mean?

a)$f(200) = 600$

b)$f'(200) = 2$

§2.4 #7. Suppose $C(r)$ is the total cost of paying off a car loan borrowed at an annual interest rate of $r\%$. What are the units of $C'(r)$? What is the practical meaning of $C'(r)$? What is its sign?

§2.4 #9. Suppose $P(t)$ is the monthly payment, in dollars, on a mortgage which will take t years to pay off. What are the units of $P'(t)$? What is the practical meaning $P'(t)$? What is its sign?

§2.4 #21. Water is flowing into a tank; the depth, in feet, of the water at time t in hours is $h(t)$. Interpret, with units, the following statements:

a) $h(5) = 3$

b) $h'(5) = 0.7$

c) $h^{-1}(5) = 7$

d) $(h^{-1})'(5) = 1.2$

§2.4 #**4***. The temperature H, in degrees Celsius, of a cup of hot coffee placed on the kitchen counter is given by $H = f(t)$, where t is in minutes since the coffee was put on the counter.

a) Is $f'(t)$ positive or negative? Give a reason for your answer.

b) What are the units of $f'(20)$? Suppose $|f'(20)| = 0.5$. What is the practical meaning of $f'(20)$ in terms of the temperature of the coffee?

§2.4 #**18**. On May 9, 2007, CBS Evening News had a 4.3 point rating. (Ratings measure the number of viewers.) New executives estimated that a 0.1 drop in the ratings correspond to a $ 5.5 million drop in revenue. Express this information as a derivative. Specify the function, the variables, the units, and the point at which the derivative is evaluated.

§2.4 #**22**. Let $p(h)$ be the pressure in dynes per cm^2 on a diver at a depth of h meters below the surface of the ocean. What do each of the following quantities mean to the diver? Give units for the quantities.

a) p(100)

b) h such that $p(h) = 1.2 \cdot 10^6$

c) $p(h) + 20$

d) $p(h + 20)$

e) $p'(100)$

f) h such that $p'(h) = 100,000$