Math 122 Review 2

1. The cost (in dollars) of producing x units of a certain commodity is $C(x) = 5000 + 10x + 0.05x^2$.
a. Find the average rate of change of C with respect to x when the production level is changed from $x = 100$ to $x = 105$.

b. Find the instantaneous rate of change of C with respect to x when $x = 100$. Explain your answer.

2. The price in dollars of a house during a period of mild inflation is described by the formula $P(t) = 85000e^{0.04t}$, where t is the number of years after 1995.
a. What is the value of the house in the year 2005?

b. At what rate will the value of the house be increasing in the year 2005?

c. When will the value of the house be increasing at a rate of $4000 per year?

3. Let $T(t)$ be the temperature (in °F) in Dallas t hours after midnight on June 2, 2001. The table shows values of this function recorded every two hours.

t	0	2	4	6	8	10	12	14
$T(t)$	73	73	70	69	72	81	88	91

a. Estimate $T'(10)$. Give units.

b. What is the practical meaning of your answer in (a)?

c. Write the equation of the tangent line to $T(t)$ when $t = 10$.

4. A manufacturer produces bolts of fabric with a fixed width. The cost of producing x yards of this fabric is $C = f(x)$ dollars.
a. What are the units of $f'(x)$?

b. In practical terms, what does it mean to say that $f'(1000) = 9$?

5. Find the equation of the tangent line to $f(x) = \frac{x+3}{4x^2-7x+1}$ at the point at which $x = 1$.

6. Find the derivative $f'(x)$.

$$f(x) = \frac{5}{x^4} + 3^x + \pi^2$$

7. Find the derivative $f'(x)$.

$$f(x) = 3^{2x^3+7x-8}$$

8. Find the derivative $f'(x)$.

$$f(x) = \frac{1}{4x^2 + 3x - 5}$$

9. Find the derivative $f'(x)$.

$$f(x) = \sqrt{x^6 - 3x^4 + 5x}$$

10. Find the derivative $f'(x)$.

$$f(x) = \ln(6x^3 - 9x^2 + 2)$$

11. Find the derivative $f'(x)$.

$$f(x) = (4x^2 + 7x - 1)^3(5x^3 + 2x^2 + 2)^5$$

12. Find the derivative $f'(x)$.

$$f(x) = \left(\frac{3x^7 - 4x^5 + 7x}{3e^x + 4}\right)^7$$

13. Find the derivative $f'(x)$.

$$f(x) = \frac{e^{2x}(x^3 + 2x + 1)^3}{7x^5 + 2}$$

14. Find the intervals over which the function is increasing, decreasing, concave up, and concave down.

$$f(x) = \frac{1}{4}x^4 + x^3 - \frac{9}{2}x^2 - 27x + 3$$

15. Identify the critical points of the function and use the first derivative test to classify each as the location of a local maximum, local minimum, or neither.

$$f(x) = (x+1)^2(x-4)^3$$

Look over how to draw the derivative from a graph of the original function, and look over how to answer questions about the original graph when looking at a graph of the derivative.