MAC 2233 FINAL EXAM A   Dr. Rapalje   NAME _____

Show all work on separate paper. Turn in ALL worksheets.

1.   Find an equation for a line (y=mx+b form) through the points (1, -2) and (3,4).

2.   Find $\dfrac{f(x+h)-f(x)}{h}$ for $f(x)=2x^2-3x+1$.

3.   Given f(x) = $\begin{cases} 4-x & \text{if } x<5 \\ 2x-11 & \text{if } x\ge 5 \end{cases}$ find a) $\lim\limits_{x\to 5^-} f(x)$, b) $\lim\limits_{x\to 5^+} f(x)$, c) $\lim\limits_{x\to 5} f(x)$, d) f(5)

   e) is f(x) continuous at 5? Explain.

4. $\lim\limits_{x\to 1} \dfrac{x^2-x}{x^2-1}$

5.   A company's cost function is $C(x)=20+3x+\dfrac{54}{\sqrt{x}}$ for $5\le x\le 20$.

   a) Find the company's marginal cost function.
   b) Find the company's marginal cost when x=9.

6.   Find the second derivative of $f(x)=\dfrac{1}{2x^3}$.

7.   Find the derivative of a) $h(z)=(3z^2-5z-1)^4$ b) $f(x)=\sqrt{x^2-5x-1}$.

8.   Use calculus to find all relative maximum and minimum points for $f(x)=\dfrac{1-x}{x^2}$.

   Use the calculator draw the graph.

9.   Find the absolute extreme values of $f(x)=x^4-4x^3-8x^2+64$ on [-1,5].

10. A homeowner wants to enclose three adjacent rectangular pens of equal size, as in the diagram below. What is the largest total area that can be enclosed using only 240 feet of fence?

11. Find dy/dx for $x^2y^2-xy=2$ and evaluate at x = -1, y = 1.

12. Find how soon an investment at 7% interest compounded continuously will
   a) double in value;   b) increase by 50%.

13. Find the derivative of a) $f(x)=\ln\sqrt{x^2+1}$ b) $f(x)=x\ln x-x$.

14. Find the derivative of a) $f(x)=2x^3-3xe^{2x}$ b) $f(x)=2x^3+3x\ln x-1$.

15. $\int(\dfrac{1}{x^2}+\dfrac{1}{x}+e^{-x})\ dx$ 16. $\int\limits_1^9 (x-\dfrac{1}{\sqrt{x}})\ dx$

17. $\int x^3\sqrt{x^4-1}\ dx$ 18. $\int\dfrac{1}{x\ln x}\ dx$