NAME_____

Math 12
Test 1
Spring 2011

You have 50 minutes to complete this test. You must *show all work* to receive full credit. Work any 8 of the following 9 problems. Clearly **CROSS OUT** the problem you do not wish me to grade. Each problem is worth 12 points, and you get 4 points for free, for a total of 100 points. The answers will be posted on the electronic reserves later today.

1. Use the ***definition of the derivative*** to find $f'(x)$ if $f(x)=\frac{1}{x^2}$.

2. Calculate the following limits.

(a) $\lim_{x\to 1}\left(\frac{1}{x^2}-\frac{1}{x}\right)$

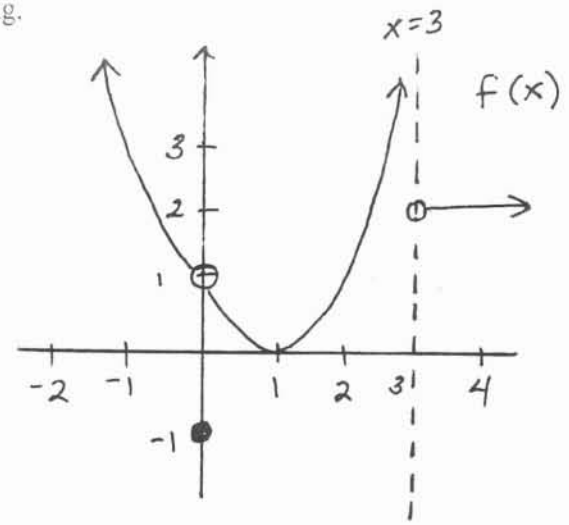
(b) $\lim_{x\to 1}\frac{x^2+x-2}{x^2-1}$

(c) $\lim_{x\to 1}\frac{\sqrt{x}-1}{x-1}$

3. A manufacturer can produce microwaves at a cost of \$80 apiece. If they are sold for x dollars each, $50 - x$ microwaves will be sold each month.

a) Express the monthly profit as a function of the price x.
b) Sketch a graph of this profit function.
c) Estimate the price that will result in the highest profit.

4. Use the given graph to determine the following.



a) $\lim_{x \to 4} f(x)$

b) $\lim_{x \to 3^+} f(x)$

c) $\lim_{x \to 3^-} f(x)$

d) $\lim_{x \to 3} f(x)$

e) $\lim_{x \to 0} f(x)$

f) At what x-values is $f(x)$ discontinuous?

5. Find $f'(x)$ for the following functions. DO NOT simplify!

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

(b) $f(x)=\left(x^2+2\right)\left(x+\sqrt{x}\right)$

(c) $f(x)=\frac{x+7x^{-4}+3}{5-2x^2+3x}$

6. Find the equation of the line tangent to the graph of $f(x)=\frac{x+\sqrt{x}}{x\sqrt{x}}$ at the point where $x=1$.

7. Find the equation of the line perpendicular to the line $x+3y=5$ which contains the point $(-2,3)$.

8. Suppose x units of a product are produced and all units will be sold if the price is $p(x)=25-\frac{1}{3}x$ dollars per unit.

   (a) Find the revenue function.
   (b) Use the marginal revenue function to ***estimate*** the revenue derived from the sale of the 9^{th} unit.
   (c) Find the ***actual*** revenue derived from the sale of the 9^{th} unit.

9. Sketch the graph of $f(x)=\begin{cases} x^2 & x<2 \\ 9 & x\geq 2 \end{cases}$ and describe the continuity of this function.