NAME_____

Math 12
Test 1
Spring 2012

You have 50 minutes to complete this test. You must *show all work* to receive full credit. Work any 7 of the following 8 problems. Clearly **CROSS OUT** the problem you do not wish me to grade. Each problem is worth 14 points, and you get 2 points for free, for a total of 100 points. If you have any questions, please come to the front and ask.

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

2. Evaluate the following limits. If any of them do not exist, EXPLAIN why not ("because it's undefined" and "denominator is zero" are not sufficient explanations).

(a) $\lim_{x\to 3}\frac{9-x^2}{x-3}$

(b) $\lim_{x\to 0^+}\left(x-\frac{1}{x}\right)$

(c) $\lim_{x\to 1}\frac{2x+3}{x+1}$

3. Suppose that George is the business manager for a company that manufactures digital cameras. If x hundred cameras are produced, they can all be sold if the price is set at $p(x) = 300 - 0.0035x^2$ dollars. The cost to produce x hundred cameras is $C(x) = 200 - 0.07x^2 + 275x$.

a) Find a function for Profit.

b) Find a function for Marginal Profit.

c) Suppose the current level of production is $x = 10$ (1000 cameras). Based on the marginal profit at this level of production, should George recommend increasing or decreasing production in order to increase profit?

4. Find $f'(x)$ (do not simplify!) if :

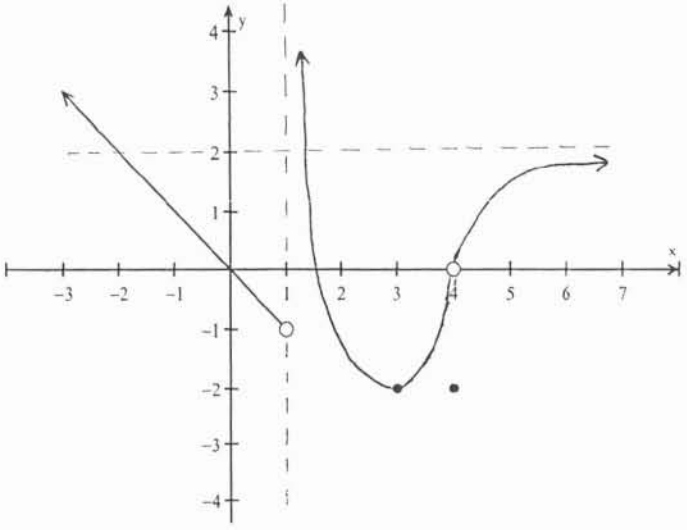
a) $f(x) = \dfrac{x}{x^2 - 1} + \dfrac{4 - x}{x^2 + 1}$

b) $f(x) = \left(2\sqrt[3]{x} + 7x^4 - 6\right)\left(x^{-3} + 2x - \pi\right)$

5. Sketch a nice big graph of $f(x)=\begin{cases} x^2+x-3 & x<1 \\ 1-2x & 1\le x<4 \\ 3 & 4\le x \end{cases}$. Be sure to clearly label points and axes. Under your graph, list the interval(s) where $f(x)$ is continuous.

6. Find the equation of the line tangent to $f(x)=\dfrac{(x^2+x-3)(4-x)}{2x-1}$ at the point where $x=1$.

7. Consider the graph of the function $f(x)$ given below.



(a) Find $\lim_{x \to 0} f(x)$.

(b) Find $\lim_{x \to 1^-} f(x)$.

(c) Find $\lim_{x \to 1^+} f(x)$.

(d) Find $\lim_{x \to 1} f(x)$.

(e) Find $\lim_{x \to 4} f(x)$.

(f) Find $\lim_{x \to +\infty} f(x)$.

8. Find the equation of the line parallel to $2x + y = 3$ which contains the point $(5,4)$.