NAME_____

Math 12
Test 1
Fall 2011

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

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) $\lim_{x \to 1} \dfrac{x^2 - 3x + 2}{x^2 + 1}$

(b) $\lim_{x \to -2^+} \dfrac{2x}{4 - x^2}$

(c) $\lim_{x \to 0} \dfrac{(x+2)^2 - 4}{x}$

3. The total cost for a manufacturer to produce $q$ units of a product is $C(q)=\frac{1}{6}q^3+642q+400$ dollars. The current level of production is 4 units. Estimate the amount by which the manufacturer should decrease production in order to reduce the total cost by \$130.

4. Find $y'$ for the following functions (do not simplify) :

a) $y=\left(\sqrt{x}-3x+1\right)\left(\sqrt[4]{x}-2\sqrt{x}\right)$

b) $y=\dfrac{5x^{-4}+x^3+7}{3x^2+x-2}$

5. A manufacturer sells all $q$ units of a product that are produced. Suppose the price of the product is \$16 per unit, fixed costs for production total \$10,000, and variable cost is given by $8q$. How many units must be produced in order for the manufacturer to break even?

6. Find the equation of the line tangent to $f(x)=\dfrac{7x^3+x}{2\sqrt{x}}$ at the point where $x=1$.

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

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

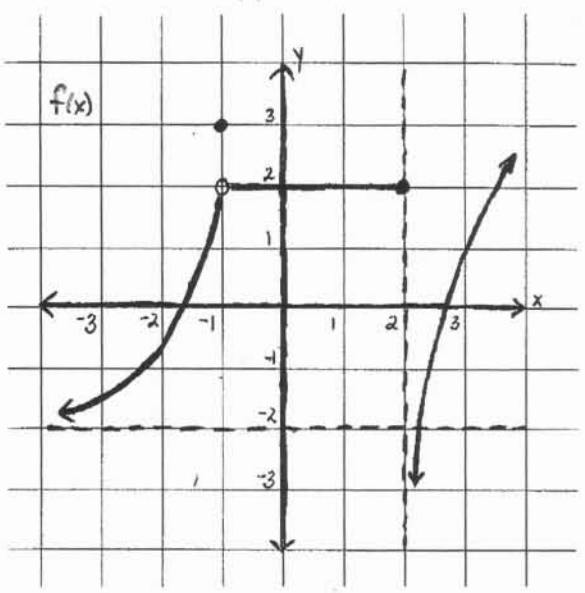
b) Find $\lim_{x\to 2^+} f(x)$.

c) Find $\lim_{x\to 2^-} f(x)$.

d) Find $\lim_{x\to 2} f(x)$.

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

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




8. Fully discuss the continuity of the function $f(x)=\begin{cases}\dfrac{3x}{x-1} & \text{if} \quad x\le 2\\ x+2 & \text{if} \quad x>2\end{cases}$.