NAME_____

Math 1212
Test 1
Fall 2014

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 $f(x) = 3 - \sqrt{x}$.

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) $\lim_{x \to -4} \dfrac{x^2 + x - 12}{x^2 - 2x - 24}$

(b) $\lim_{x \to 4^+} \dfrac{x - 3}{x - 4}$

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

3. During the summer, a group of students runs a lawn care business. Suppose it costs them \$1450 for a riding mower, and that the gas for the mower for an average lawn will cost \$2. The price they charge to cut an average lawn is \$60.

a) How many lawns must the students cut to break even?
b) How many lawns must the students cut to make a profit of \$1000?

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

a) $f(x)=\left(3x^2-2\right)\left(\sqrt{x}^3+10x\right)$

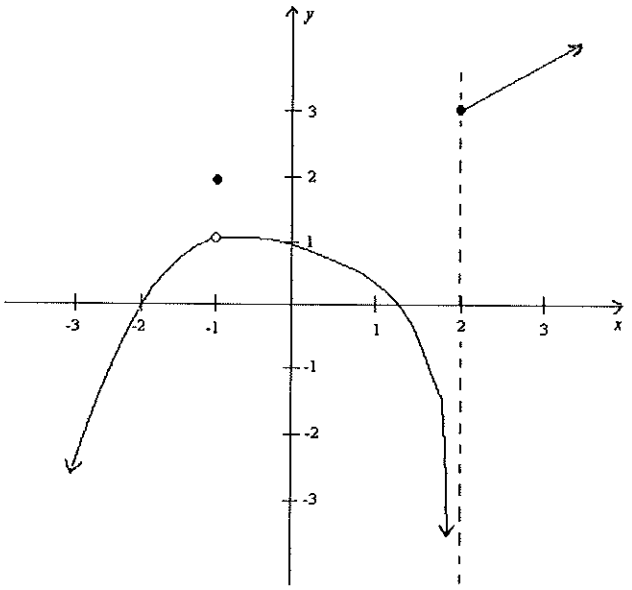
b) $f(x)=2x^{\frac{-1}{2}}+3-15x^3-\frac{1}{3x}$

5. Suppose the total cost of manufacturing q units is $C(q) = 3q^2 + q + 500$ dollars.

a) Use marginal analysis to ***estimate*** the cost of manufacturing the 41st unit.
b) Calculate the ***actual*** cost of manufacturing the 41st unit.

6. Find the equation of the line tangent to $f(x) = \dfrac{x^2 - 1}{\left(3x^{\frac{2}{3}} + x^2\right)(2x - 5)}$ at the point where $x = 1$.

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



a) For what values of x is $f(x)$ discontinuous?

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

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

8. Is the function $f(x)=\begin{cases} 2x^2+1 & \text{if } x<3 \\ 6x+2 & \text{if } x\geq 3 \end{cases}$ continuous at $x=3$? Explain why or why not.