NAME_____

Math 12
Test 1
Fall 2013

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. If you have any questions, please come to the front and ask.

1. Using the definition of the derivative, find $f'(x)$ if $f(x)=\dfrac{2}{3x-4}$.

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

(b) $\lim\limits_{x\to 2} \dfrac{x^2-3x}{x+1}$

(c) $\lim\limits_{x\to 2} \dfrac{x^3-8}{2-x}$

3. An efficiency study of the morning shift at a packaging plant indicates that an average worker arriving on the job at 8:00 am will have packed a total of $Q(t) = -t^3 + 9t^2 + 12t$ boxes ready for shipping t hours later.

a) Using marginal analysis, ***estimate*** how many boxes the worker will pack between 9:00 am and 10:00 am.

b) Find the ***exact*** number of boxes the worker actually packs between 9:00 am and 10:00 am.

4. Find the equation of the line parallel to $3y - 5x + 10 = 0$ that goes through the point $(-4, -2)$.

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

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

a) $y=\dfrac{x^2+4}{(2x-1)(x^2+3x-2)}$

b) $y=\dfrac{-x^2}{16}+\dfrac{2}{x}-\sqrt[3]{x^2}-\dfrac{1}{x}+\dfrac{1}{3x^2}+x^{-2}$

7. A bus company uses the following pricing structure when charging groups to charter their buses. Groups containing no more than 40 people will be charged a fixed amount of \$2400 (40 times \$60). In groups containing between 40 and 80 people everyone will pay \$60 minus 50 cents for each person in excess of 40. The company's lowest fare of \$40 per person will be offered to groups that have 80 people or more. Express the bus company's revenue as a function of the size of the group.

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

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

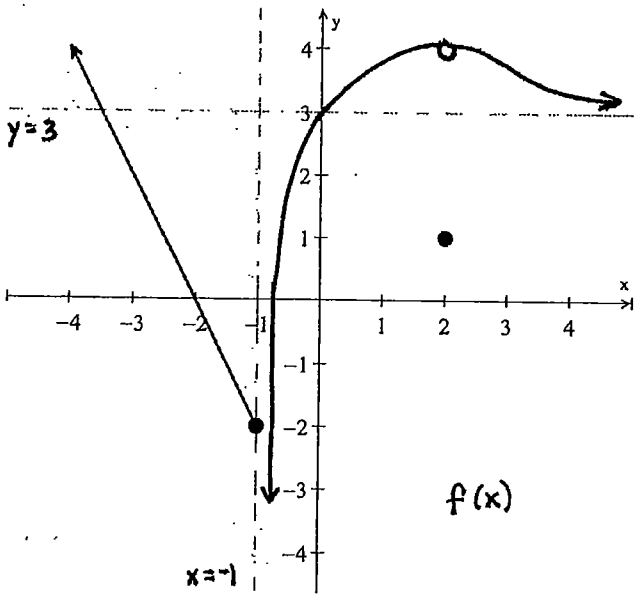
b) Find $\lim_{x\to -2} f(x)$.

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

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

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

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



9. Sketch the graph of $f(x)=\begin{cases} 1-x & \text{if } x<2 \\ x^2-2x & \text{if } x\geq 2 \end{cases}$. Fully describe the continuity of this function.