NAME_____

Math 12
Test 1
Fall 2010

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 $f(x)=\dfrac{1}{x-2}$.

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) $\lim\limits_{x\to 4}\dfrac{9-x}{3-\sqrt{x}}$

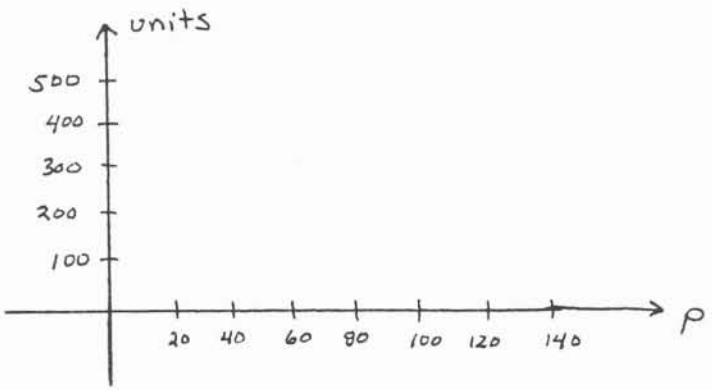
(b) $\lim\limits_{x\to 2^+}\dfrac{x+1}{x-2}$

(c) $\lim\limits_{x\to -2}\dfrac{x^2-x-6}{x^2+3x+2}$

3. The supply of a product is given by $S(p) = p - 10$ units and the demand is given by $D(p) = \dfrac{5600}{p}$ units when the price is p dollars.

a) Find the equilibrium price and the corresponding number of units supplied and demanded.

b) Draw the supply and demand curves on the given set of axes.



c) Where does the supply curve cross the p-axis? Describe the economic significance of this point.

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

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

b) $y = x\sqrt{x} + \dfrac{4}{3x^2}$

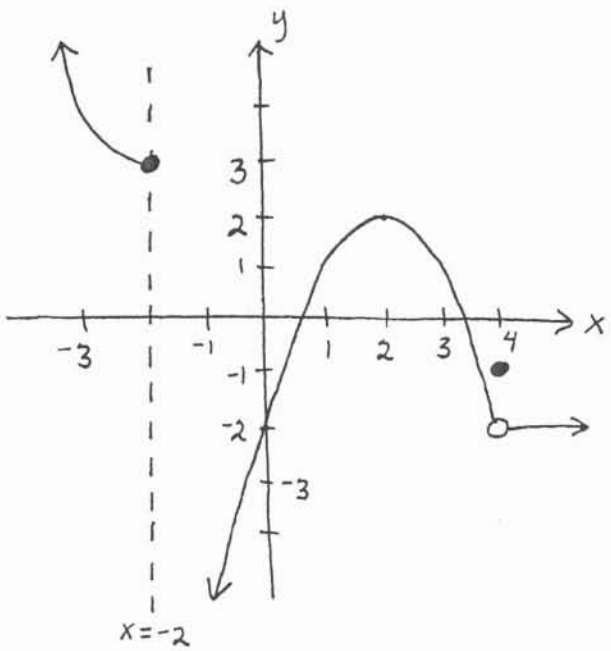
5. Suppose the total cost to produce x units of a product is $C(x)=\frac{1}{3}x^2+65$ dollars.

a) Use marginal analysis to ***estimate*** the cost to produce the 7th unit.

b) What is the ***actual*** cost to produce the 7th unit?

6. Find the equation of the line tangent to $f(x)=\frac{\sqrt{x}}{x+1}$ at the point where $x=4$.

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

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

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

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

8. Sketch the graph of the function $f(x)=\begin{cases} 1-x & \text{if } x\le 2 \\ 2x-x^2 & \text{if } x>2 \end{cases}$. Fully discuss the continuity of this function.