

NAME \_\_\_\_\_

Math 1212  
Test 1  
Spring 2015

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  $f(x) = \frac{3}{2x-1}$ .

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)  $\lim_{x \rightarrow 3} \frac{2x+1}{x^2-1}$

(b)  $\lim_{x \rightarrow 4} \frac{\sqrt{x}-2}{x-4}$

(c)  $\lim_{x \rightarrow 1} \frac{x+1}{(x-1)^2}$

3. During the summer, a group of students builds kayaks in a converted garage. The rental for the garage is \$1500 for the whole summer, and the cost for materials to build one kayak is \$125. Each kayak can be sold for \$275. How many kayaks must the students sell in order to break even?

4. Find, but DO NOT simplify,  $f'(x)$  if:

a)  $f(x) = (x^2 + 2)(x + \sqrt{x})$

b)  $f(x) = \frac{4x^3 - 3\sqrt{x}}{10x + 2} - 15x^2 + 7$

5. Suppose that the total cost of producing  $x$  units of a product is given by  $C(x) = \frac{1}{8}x^2 + 3x + 98$ , and that all  $x$  units will be sold if the price is set at

$$p(x) = 25 - \frac{1}{3}x \text{ dollars per unit.}$$

a) Find an equation for revenue.

b) Find an equation for profit.

c) Using marginal analysis, estimate the profit obtained by the production and sale of the 6th unit.

d) Find the actual profit obtained by the production and sale of the 6th unit.

6. Find the equation of the line tangent to  $f(x) = \frac{(2x-5)(x+7)}{x^2+3}$  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?

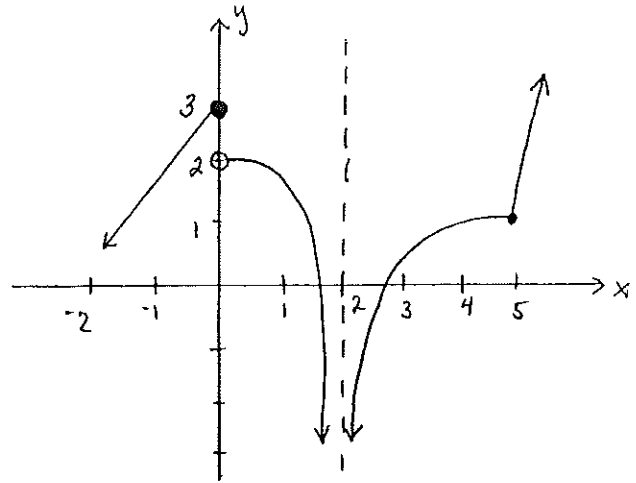
b) Find  $\lim_{x \rightarrow 5} f(x)$ .

c) Find  $\lim_{x \rightarrow 0^-} f(x)$ .

d) Find  $\lim_{x \rightarrow 0^+} f(x)$ .

e) Find  $\lim_{x \rightarrow 0} f(x)$ .

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



8. Sketch a nice big graph of  $f(x) = \begin{cases} x^2 - 3x + 2 & \text{if } x < 2 \\ -5x + 2 & \text{if } x \geq 2 \end{cases}$ . Be sure to clearly label points and axes. Fully describe the continuity of this function.