

NAME _____

Math 1212
Test 1
Fall 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 $f(x) = x^3 - 4$.

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)
$$\lim_{x \rightarrow 3} \frac{x^2 - 2x - 3}{9 - x^2}$$

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

(c)
$$\lim_{x \rightarrow -1} \frac{2x}{x + 5}$$

3. 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 $p(x) = 25 - \frac{1}{3}x$ 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.

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

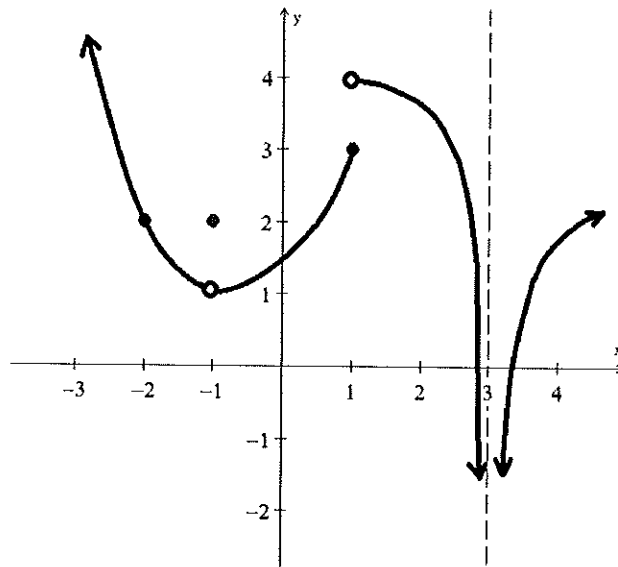
a) $f(x) = \left(2x^3 - \frac{4}{x^2} + 1\right)(\sqrt[3]{x} + 5x - 4)$

b) $f(x) = \frac{x - 5x^6 + 4}{3x + 2}$

5. Suppose $f(x) = \begin{cases} Ax - 2 & x < 1 \\ x^2 - 4x + 4 & x \geq 1 \end{cases}$. Find the value for A that will make f continuous. Be sure to show your work and explain why your value makes f continuous.

6. Find the equation of the line tangent to $f(x) = \sqrt[4]{x} - 2x^2 + 5$ at the point where $x = 1$.

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



- (a) For what values of x is $f(x)$ **not** continuous?
- (b) Find $\lim_{x \rightarrow -2} f(x)$.
- (c) Find $\lim_{x \rightarrow 1^-} f(x)$.
- (d) Find $\lim_{x \rightarrow 1^+} f(x)$.
- (e) Find $\lim_{x \rightarrow 1} f(x)$.
- (f) Find $\lim_{x \rightarrow 3} f(x)$.
8. A rectangular box with no top and a **square** base is to be built for \$48. The sides of the box will cost \$3 per square meter, and the base with cost \$4 per square meter. Express the volume of the box in terms of the length of the base.