

**Math 167 Ch 1 – 2 Sample Test**

Name \_\_\_\_\_

Show your work to receive credit. (Each problem is 5 points)

I. Simplify the following:

1.  $(2x + 3)(x - 1) + (x - 4)^2$

2.  $\frac{(x^2 y^{-3})^2}{(2x^3)(5x^{-4})}$

3.  $\frac{1}{x+2} - \frac{3}{x}$

4.  $\frac{5}{4 - \sqrt{3x}}$  (rationalize the denominator)

5.  $x^2(x - 6)^{-1/2} + (x - 6)^{1/2}$  (factor completely)

II. Given the points  $(-3, 4)$  and  $(2, 1)$ , find:

6. The slope and the equation of the line through the points.

7. Find the x and y-intercepts of the line.

III. Given  $f(x) = \sqrt{x-5}$  and  $g(x) = \frac{x}{x^2-9}$ 

8. Find the domain of each function.

9. Find  $g(f(9))$ 10. For what values of  $x$  is each function discontinuous?IV. Sketch a graph where:  $f(2) = 3$  and  $\lim_{x \rightarrow 2} f(x) = 1$ V. Find  $\lim_{x \rightarrow 2} \frac{2x - 4}{x^2 + x - 6}$ 

12. Graphically

13. Algebraically

VI. Find the indicated limits, state if they do not exist.

14.  $\lim_{x \rightarrow 2} \frac{x}{x^2 - 5x}$

15.  $\lim_{x \rightarrow 0} \frac{x}{x^2 - 5x}$

16.  $\lim_{x \rightarrow 5} \frac{x}{x^2 - 5x}$

17.  $f(x) = \begin{cases} 2x + 3 & \text{if } x < 1 \\ x^2 & \text{if } x \geq 1 \end{cases}$  find:  $\lim_{x \rightarrow 3} f(x)$  and  $\lim_{x \rightarrow 1} f(x)$

VII. Explain what it means for  $f(3) = 4$  and  $f'(3) = 2$ .VIII. Use the definition to find the derivative of  $f(x) = x^2 + 3x$ .IX. A company has fixed cost of \$30,000, a cost of \$6 for each unit it manufactures, and a unit sells for \$13. What is its profit function for  $x$  items and what is its profit for producing 12,000 items?