## Name: \_\_\_\_\_\_ Math 151, Calculus I – Crawford

## Exam 1 01 March 2016

	Score	
	1	/8
work.	2	/6
	3	/10
	4	/10
	5	/14
	6	/6
	7	/8
	8	/14
	9	/12
	10	/8
	11	/6
	Total	/100

• Calculators, books, or notes (in any form) are  $\underline{not}$  allowed.

• Clearly indicate your answers.

- Show all your work partial credit may be given for written work.
- Good luck!

**1.** (8 pts). Given f(x) = 2x - 3 and  $g(x) = \frac{1}{\sqrt{5x+1}}$ , find and <u>simplify</u>  $g \circ f$ . Also state the domain of  $g \circ f$ .

 $f(x) = |x| + 2x^3$ 

**3.** (10 pts). Solve the following inequality for x. Write your answer in interval notation.

 $x^2(x^2 - 4x - 21) < 0$ 

4. (10 pts). Solve the following equation for x. Find all solutions.

 $2\cos x \sin x + \sqrt{3}\cos x = 0$ 

5. (14 pts). Evaluate the following limits, if they exist. Clearly indicate  $+\infty$  or  $-\infty$  in the case of an infinite limit. If the limit does not exist, clearly explain the reason why.

(a).  $\lim_{x \to 2} \frac{x-3}{x^2+3x-10}$ 

(b). 
$$\lim_{x \to -1} \frac{x^2 + 5x + 4}{x^2 + x}$$

**6.** (6 pts). <u>Write down</u> a function f(x) whose graph has an infinite discontinuity at x = 0 and a removable discontinuity at x = 2. [You must write down a function f(x). A graph of the function is not acceptable.]

7. (8 pts). Given  $f(x) = \sqrt{2x+1}$ , <u>Use the limit definition</u>  $f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$  to find f'(4).

[You must use the limit definition and show all your work.]

[Note:  $f'(x) = \frac{1}{\sqrt{2x+1}}$ , but you must show your work using the limit definition.]

8. (14 pts). Let  $s(t) = 3t - 2t^2$  be the displacement (in meters) of a particle moving in a straight line. Time t is measured in seconds.

(a). Find the average velocity of the particle going from t = 1 to t = 3 seconds.

(b). <u>Use the limit definition</u>  $v(a) = s'(a) = \lim_{h \to 0} \frac{s(a+h) - s(a)}{h}$  to find the instantaneous velocity at t = 3.

[You must use the the limit definition and show all your work.]

## Page 6

## For the remainder of the test, use the DIFFERENTIATION RULES to find any needed derivatives. Do <u>NOT</u> use the limit definition.

**9.** (12 pts). Differentiate the following using Differentiation Rules. Do <u>NOT</u> use the limit definition! [Do not simplify.]

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

**(b)**. 
$$s(t) = \frac{3t^5 - 2t^3 + 1}{t^3 + 2}$$

10. (8 pts). Find the equation of the tangent line to y = (2x - 1)(x + 5) at x = 2.

11. (6 pts). True or False. Clearly indicate whether the following statements are true or false.

- T F If  $f(x) = \frac{6}{x-1}$  then the Intermediate Value Theorem guarantees that f(x) will go through y = 5 somewhere in the interval (2, 4).
- T F The graph of y = f(4x) will stretch the graph of y = f(x) horizontally by 4.
- T F Given the graph of y = f(x) below left, its derivative is given by the graph below it.



Is this the derivative f'(x)?