Name: ______ Math 151, Calculus I – Crawford

Exam 1 28 February 2017

Score	
1	/6
2	/8
3	/6
4	/18
5	/16
6	/14
7	/7
8	/14
9	/7
10	/4
11	/4
Total	/104

- Calculators, books, notes (in any form), cell phones, and any unauthorized sources are <u>not</u> allowed.
- Clearly indicate your answers.
- Show all your work partial credit may be given for written work.
- Problems #4, 5, & 9 will be used to determine extra-credit for Quiz 1.
- Good luck!

1. (6 pts). Find the domain of $f(x) = \frac{x+1}{\sqrt{3x+8}}$

2. (8 pts). Solve the following inequality for x.

$$\frac{(x-1)^2(x-4)}{x+3} \le 0$$

3. (6 pts). Given $f(x) = x^2 + 1$ and $g(x) = \frac{1}{3 - 4x}$, find and simplify $g \circ f$.

4. (18 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).
$$\lim_{x \to 3} \frac{x^2 - 9}{x^2 + x - 12}$$

(b).
$$\lim_{x\to 2} \frac{2x-5}{x(x-2)}$$

(c).
$$\lim_{x \to 4} \frac{2 - \sqrt{x}}{4 - x}$$

5. (16 pts). Let $f(x) = \frac{1}{x}$.

(a). Find the *slope* of the secant line connecting the points at x = 1 and x = 4.

(b). <u>Use the limit definition</u> $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ to show that the derivative is $f'(x) = -\frac{1}{x^2}$. You must show all your work.

(c). Find an equation of the tangent line to the graph at x = 4.

For the remainder of the test, use the DIFFERENTIATION RULES to find any needed derivatives.

Do \underline{NOT} use the limit definition.

6. (14 pts). Differentiate the following using Differentiation Rules. Do <u>NOT</u> use the limit definition! Do not simplify.

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

(b).
$$g(t) = \frac{(2t+3)(t^2-4t)}{5t^3-t+3}$$

7. (7 pts). Given $h(x) = x^2 \cdot g(x)$ and g(2) = 3 and g'(2) = -2, find h'(2)

8. (14 pts). Given $y = 3x^2 + 7x - 10$.

(a). Find the equation of the tangent line to y at (2, 16).

(b). Find the point(s) on the curve where the tangent line has a slope of 1.

9. (7 pts). Find the value of c so that the following function is continuous for all x. $g(x) = \begin{cases} 2x^2 - 1, & x \le 2\\ 4 - cx, & x > 2 \end{cases}$ 10. (4 pts). True or False. Clearly indicate whether the following statements are true or false.

T F If f(2) = -5 and f(10) = 8, then there must be a number c in the interval (2, 10) such that f(c) = 0.

T F The function
$$f(x) = \frac{x}{x^2 + 1}$$
 is odd.

11. (4 pts). Given the graph of f(x) below,



(a). Which of the following is a graph of y = -f(x-2) + 1?









(ii)



(iii)

