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

## Exam 2 05 April 2016

	Sco	Score	
	1	/8	
itten work.	2	/8	
	3	/6	
	4	/16	
	5	/12	
	6	/12	
	7	/14	
	8	/10	
	9	/8	
	10	/8	
	Total	/100	

- $\bullet\,$  Calculators, books, or notes (in any form) are  $\underline{\textit{not}}$  allowed.
- Clearly indicate your answers.
- Show all your work partial credit may be given for written work.
- Good luck!

**1.** (8 pts). Find the equation of the tangent line to  $f(x) = 2x + \tan(x)$  at  $x = \pi$ .

**2.** (8 pts). Given that  $f(x) = \frac{4x}{g(x^2)}$ , find f'(2) and g is a differentiable function.

(a). Find f'(x).

(b). Given g(2) = 4, g'(2) = 3, g(4) = -2, and g'(4) = 1 and your result from part (a), find f'(2).

**3.** (6 pts). A spherical balloon is being inflated. The surface area is given by  $S = 4\pi r^2$  where r is given in inches. Find S'(2) and state what it means. [One sentence should suffice.] 4. (16 pts). Differentiate the following.

(a). 
$$f(x) = \sin^2(\pi x)$$

[Do not simplify!]

**(b)**.  $y = \frac{x^3(5x^2+2x)^4}{x^2+1}$ 

[Do not simplify!]

5. (12 pts). Use implicit differentiation to find the second derivative y'' in terms of x and y only. [Do not simplify.]

 $x^2 = xy + 4$ 

6. (12 pts). Find the absolute maximum and minimum values of  $f(x) = (x^2 - 1)^3$  on the interval [-1, 2].

7. (14 pts). Two kids are controlling remote-control toy ships in a lake. Ship A is 10 ft west of ship B. Ship A is traveling east at 3 ft/s and ship B is traveling north at 1.5 ft/s. How fast is the distance between the ships changing 2 seconds later.

[Remember that significant partial credit will be given for clearly and accurately labeling the picture, and indicating values and equations in correct mathematical notation.]

8. (10 pts). Given  $f(x) = \sqrt{3 + x^2}$ 

(a). Find the linearization L(x) at a = 1

(b). Use this linearization L(x) to approximate  $\sqrt{4.21} = f(1.1)$ .

Simplify your answer.

**9.** (8 pts). Apply the Mean Value Theorem to the function  $f(x) = \frac{3}{x}$  on the interval [1, 3] and find all values of c that satisfy the MVT.

10. (8 pts). The graph below is the first derivative f' of a function f (not shown). Determine whether the following statements are true or false.

- T F The function f is increasing on the interval (0, 5).
- T F The function f has a local maximum at x = 1.
- T F The function f has a local maximum at x = 5.
- T F The function f is concave down on the intervals  $(1,3) \cup (3,\infty)$ .

