

MA 125-CW, CALCULUS I

February 8, 2016

Name (Print last name first): .....

TEST I

Show all your work! No partial credit will be given for the answer only!

PART I

Part I consists of questions. Clearly write your answer in the space provided after each question. Show all of your your work!

All problems in Part I are 7 points each

Evaluate the following limits.

Question 1

Use the **definition** of the derivative to show that the derivative of  $y = f(x) = 5x + 3$  is  $f'(x) = 5$ .

Question 2

Find the derivative of  $f(x) = x^2 \sin(x)$

Answer: .....

Question 3

Find the derivative of  $y = f(x) = \frac{1-x^3}{1+x^3}$ .

Answer: .....

Question 4

Find the derivative of  $y = f(x) = \sqrt[5]{x}(x^3 + x^5)$ .

Answer: .....

Question 5

Find the equation of the tangent line to the graph of  $y = f(x) = \tan(x)$  at the point  $a = \pi/4$ .

Answer: .....

Question 6

Evaluate the limit  $\lim_{x \rightarrow \infty} \frac{\cos^3(x) + 2}{x^5}$

Answer: .....

Question 7

Evaluate the limit  $\lim_{x \rightarrow 5} \frac{x^2 - 2x - 15}{x^2 - 25}$

Answer: .....

**PART II**

**Part II consists of 4 problems. You must show correct reasons to get full credit. Displaying only the final answer (even if correct) without the relevant steps will not get full credit.**

**Problem 1 (10 points)**

Suppose that  $S(t) = t^5 - 5t$   $m$  is the position of a particle at time  $t$  (in seconds) on a line. Find:

- (a) the velocity at time  $t$ .
- (b) The displacement  $S(t_2) - S(t_1)$  from  $t_1 = 0$  to  $t_2 = 2$ .
- (c) Is the **VELOCITY** increasing or decreasing when  $t = -1$ ?

**Problem 2 (10 points)**

Given the graph of the function  $y = f(x)$  below find:

1.  $\lim_{x \rightarrow -1^-} f(x) =$
2.  $\lim_{x \rightarrow -1^+} f(x) =$
3.  $\lim_{x \rightarrow -1} f(x) =$
4.  $\lim_{x \rightarrow 2^-} f(x) =$
5.  $\lim_{x \rightarrow 2^+} f(x) =$
6.  $\lim_{x \rightarrow 2} f(x) =$
7.  $\lim_{x \rightarrow \infty} f(x) =$
8.  $\lim_{x \rightarrow -\infty} f(x) =$
9. State all intervals on which  $f(x)$  is continuous.
10. State all intervals where  $f(x)$  is differentiable.

**Problem 3 (10 points)**

Find all points on the graph of  $f(x) = 2x^3 - x$  where the tangent line is parallel to the line  $y = 149x + 7$ .



**Problem 5 (10 points)**

Evaluate the following limits. Like always, justify your answers.

1.  $\lim_{x \rightarrow \infty} \sqrt{x} + \sqrt{x+1}$

2.  $\lim_{x \rightarrow 0} \frac{\tan(x)}{x}$

Scratch paper