

# Math 1271-002 (Calculus 1). Spring 2015.

## *Practice Exam 1*

Name: \_\_\_\_\_

TA: \_\_\_\_\_

Section: \_\_\_\_\_

1. **Do not open this exam until you are told to do so.**
2. This exam has 6 pages including this cover. There are 5 problems.
3. Not all problems are of equal difficulty, so you may want to skip over and return to a problem on which you are stuck.
4. Do not separate the pages of this exam. If they do become separated, write your name on every page and point this out to your instructor when you hand in the exam.
5. Show an appropriate amount of work for each problem.
6. You may (but do not need to) use a scientific calculator.
7. No notecards are allowed.
8. **No cell phones, smartphones, headphones, or other devices allowed.**

**Problem 1.** Find the following limits

a. (5 points)  $\lim_{x \rightarrow 4} \frac{x^2 - 3x - 4}{x - 4}$

**Answer:** \_\_\_\_\_

b. (5 points)  $\lim_{x \rightarrow 1} \frac{\sqrt{x} - 1}{1 - x}$

**Answer:** \_\_\_\_\_

c. (5 points)  $\lim_{x \rightarrow 0} \frac{\sin(2x)}{x}$

**Answer:** \_\_\_\_\_

d. (5 points)  $\lim_{x \rightarrow -1} \frac{x^2 - 1}{\sin(x + 1)}$

**Answer:** \_\_\_\_\_

**Problem 2.**

a. (3 points) Suppose  $f(s) = \sin\left(\frac{1}{\ln(s)}\right) + e^s$ . Write down the definition of  $f'(1)$ . Your answer should not involve  $f$ . Do not attempt to evaluate the limit.

**Answer:**  $f'(1) =$  \_\_\_\_\_

b. (5 points) Find the derivative of  $f(s) = \sqrt{s+3}$  using the definition of derivative.

**Answer:**  $f' =$  \_\_\_\_\_

b. (5 points) Find the derivative of  $f(w) = w^2 + 5$  using the definition of derivative.

**Answer:**  $f' =$  \_\_\_\_\_

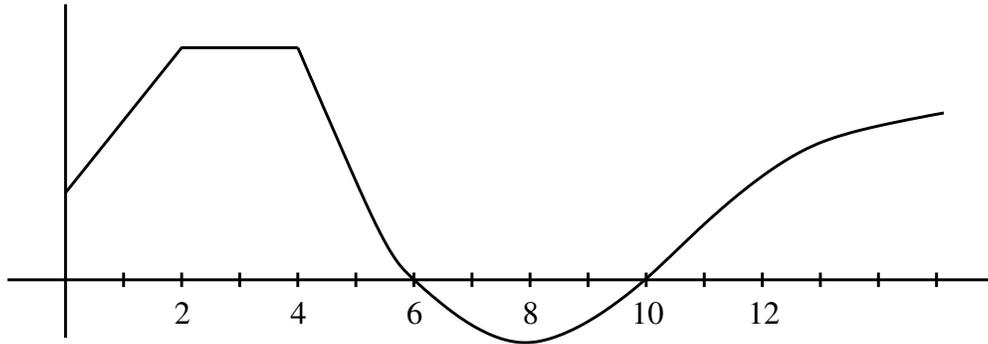
**Problem 3. a.** (5 points) Find the equation of the tangent line to the curve  $f(t) = e^t + 4t$  when  $t = 0$ .

**Answer:**  $y =$  \_\_\_\_\_

**b.** (5 points) Find the derivative of  $f(t) = t^3 + 10te^t + 2^{4t}$ .

**Answer:**  $f'(t) =$  \_\_\_\_\_

**Problem 4.** Below is the graph of  $f'(x)$ , the derivative of a function  $f(x)$ .



a. (2 points) On what intervals is  $f(x)$  increasing? Why?

**Answer:** \_\_\_\_\_

b. (2 points) On what intervals is  $f(x)$  linear? Why?

**Answer:** \_\_\_\_\_

c. (2 points) On what intervals is  $f''(x)$  positive? Why?

**Answer:** \_\_\_\_\_

d. (2 points) On what intervals is  $f''(x)$  increasing? Why?

**Answer:** \_\_\_\_\_

e. (2 points) If  $f(0) = 5$ , compare the value of  $f(6)$  to 5. More precisely, is  $f(6)$  is smaller, bigger, or equal to 5? Why?

**Answer:** \_\_\_\_\_

**Problem 5.** Find the value of the constant  $a$  for which the function

$$f(x) = \begin{cases} \frac{x^2 - x}{x - 1} & \text{if } x < 1 \\ 2x + a & \text{if } x \geq 1 \end{cases}$$

is continuous.

**Answer:**  $a =$  \_\_\_\_\_