

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

## *Practice Midterm 2*

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

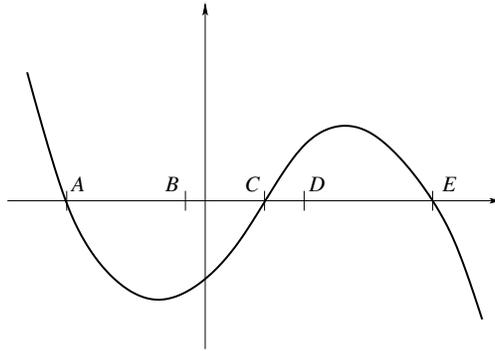
TA: \_\_\_\_\_

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.**

1	
2	
3	
4	
5	
<i>Total</i>	

**Problem 1.** (10 points) This problem deals with ideas emphasized in Sections 4.3 and 4.5. The graph of  $f'(x)$ , the derivative of  $f(x)$ , is shown below.



For each part, list **\*all\*** the  $x$  values labeled on the graph which satisfy the corresponding statement.  
(You do not need to show your work and there is no partial credit.)

- The function  $f(x)$  has a local minimum at  $x =$  \_\_\_\_\_
- The function  $f(x)$  is increasing around  $x =$  \_\_\_\_\_
- The function  $f(x)$  is concave up at  $x =$  \_\_\_\_\_
- The function  $f'(x)$  is concave up at  $x =$  \_\_\_\_\_
- The function  $f''(x)$  has a critical point at  $x =$  \_\_\_\_\_

**Problem 2. a.** (4 points) Find the local linearization  $L(x)$  of  $f(x) = (x + 8)^{1/3}$  near  $x = 0$ .

**Answer:**  $L(x) =$  \_\_\_\_\_

**b.** (3 points) Use the local linearization to estimate  $(8.1)^{1/3}$ .

**Answer:**  $(8.1)^{1/3} \approx$  \_\_\_\_\_

**c.** (3 points) Do you expect the estimate to be an overestimate or an underestimate? (Make sure to justify your answer)

**Problem 3.** This problem concerns Section 4.7. A farmer is designing a fence next to his barn for his cattle. The fence will be rectangular in shape. Three sides of the fence will be wooden, and the side closest to the barn will be chain link. The cows need 40,000 square feet of space. The cost of wooden fence is \$6 per foot and the cost of chain link is \$3 per foot. What are the dimensions of the cheapest fence the farmer can build?

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

**Problem 4.** (10 points)

A 10ft ladder is leaning against the wall. A heavy object is placed on one of the steps and the ladder slips and begins to fall. As the ladder is falling, the top end moves vertically downward along the wall while the bottom end moves directly away from the wall. If the bottom end is 5ft away from the wall and is moving away at 2ft per second, how fast is the top end moving?

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

**Problem 5.** Let  $f(x) = x^{\sqrt{x}}$ . Compute:

a. (5 points)  $f'(x)$ .

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

b. (5 points)  $\lim_{x \rightarrow 0^+} f(x)$ .

**Answer:**  $\lim_{x \rightarrow 0^+} f(x) =$  \_\_\_\_\_