

Math 211

Spring 2007

Exam II

S. Bolotin

Lecture 2

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

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

Your Section Meeting Time: \_\_\_\_\_

PROBLEM	POINTS	SCORE
I	20	
II	20	
III	20	
IV	20	
V	20	
TOTAL	100	

Show all your work: no work - no credit. Leave your answers in exact forms (using  $e$ ,  $\ln 2$ ,  $\sqrt{2}$  and similar numbers). Circle your answer. You may use the last page as scratch paper, but it will not be checked. Hand in your exam to your TA.

I. (20 points) In each problem find the derivative of  $f(x)$ .

(a)  $f(x) = xe^{(x^2+3x+5)}$

(b)  $f(x) = 5\ln(x^3 + 2/x^2)$

(c)  $f(x) = \frac{x^3 + 2}{x^2 + 3}$

II. (20 points) The equation

$$\sqrt{3x^2 + y^2} = 2e^{x-y}$$

defines  $y$  as a function of  $x$ . Find the slope of the curve  $y = y(x)$  at the point  $x = 1, y = 1$ .

III. (20 points) Suppose  $f(x) = x^4 - 8x^3 + 18x^2 + 2$ .

(a) What are the critical points of  $f(x)$ ?

(b) What are the intervals on which  $f(x)$  is increasing? Decreasing?

(c) What are the intervals on which  $f(x)$  is concave up? Concave down?

(d) Give all  $x$  values at which  $f(x)$  has a local minimum.



- V. (20 points) A closed box with a square base is to have a volume of 250 cubic feet. The material for the top and the bottom of the box costs \$2 per square feet, and the material for the sides costs \$1 per square feet. Find the minimal possible cost of the box.

Scratch paper