

NAME: _____

Student ID #: _____

QUIZ SECTION: _____

Math 112 A
Midterm II
May 17, 2011

Problem 1	15	
Problem 2	15	
Problem 3	10	
Problem 4	10	
Total:	50	

- You are allowed to use a calculator, a ruler, and one sheet of notes.
- Other than this cover page, your exam should contain 4 problems on 4 pages. Make sure you have a complete test.
- Unless otherwise noted, you **must show how you get your answers**. **Answers with incorrect work (or with no supporting work) may result in little or no credit, even if they are correct.**

If an algebraic method is available, answers obtained by guessing, reading a value off a graphing calculator, or plug-and-check will get little or no credit. We need to see all main steps of your solution.

- Write your **final answer in the indicated spaces**. Unless otherwise noted, you may round your final answer to two decimal digits.
- If you need more room, use the backs of pages and indicate to the grader that you have done so.
- Raise your hand if you have a question.

GOOD LUCK!

1 (15 points) Compute the derivatives of the following functions. Box your final answer. **Do not simplify.**

a) $f(x) = \sqrt{x^3 e^x + 1}$

$$f'(x) =$$

b) $z = \frac{y \ln(y)}{y^2 + 5}$

$$\frac{dz}{dy} =$$

c) $g(t) = \ln(\sqrt{t^3 - 2t + 1})$

$$g'(t) =$$

2 (15 points) Consider the function

$$f(x) = \frac{x^3}{3} - 15x^2 + 200x$$

a) (3 pts) Compute all critical numbers of $f(x)$.

ANSWER: $x =$ _____ (list all)

b) (5 pts) For each of the points you found in part (a), use the Second Derivative Test to determine whether it is a local minimum or a local maximum. Show all your work and circle your answers.

c) (3 pts) Is the graph of $f(x)$ increasing or decreasing at $x = 0$? Justify.

ANSWER: _____

BECAUSE: _____

d) (4 pts) Determine the **minimum value** of $f(x)$ on the interval from $x = 1$ to $x = 15$. Show work.

ANSWER: The **minimum value** of $f(x)$ on the given interval is _____

3 (10 points) The Cobb-Douglas production function for a certain Factory is given by the formula:

$$P = 1.7L^{0.3}K^{0.8}$$

where P represents the factory's production (in hundreds of items), L is the labor force (measured in workers) and K is the capital investment (measured in **thousands of dollars**).

a) (2 pts) What is the production for a labor force of 100 workers and a capital investment of \$2,500,000?

ANSWER: _____ hundred items

a) (4 pts) Compute the partial derivatives. Simplify your answers.

$$\frac{\partial P}{\partial L} =$$

$$\frac{\partial P}{\partial K} =$$

b) (4 pts) Suppose this factory has a labor force of 100 workers, and \$1,500,000 in capital investment. Use a partial derivative to estimate the change in production if the capital investment stays the same, but an additional worker is hired. Show all steps.

ANSWER: _____ hundred items

