NAME: ________________________________ Student ID #: _________________

QUIZ SECTION:______

Math 112
Midterm II
February 28th, 2008

Problem 1	**12**	
Problem 2	**14**	
Problem 3	**12**	
Problem 4	**12**	
Total:	**50**	

- You are allowed to use a calculator, a ruler, and one sheet of notes.
- Your exam should contain 5 pages in total and 4 problems.
  Make sure you have a complete test.
- Unless otherwise noted, you **must show how you get your answers**.
  Correct (or incorrect) answers with no supporting work may result in little or no credit.
- If an algebraic method is available, answers obtained by guessing, approximating, using your graphing calculator, or plug-and-check will get little or no credit.
- Write your **final answer in the indicated spaces**. Unless otherwise noted, round your answer to two decimal digits.
- If you need more room, use the backs of pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

GOOD LUCK!

Do you want me to post your grade so far on the class website under the last 4 digits of your STUDENT ID (in about a week)?

☐ *Yes, please post my grade. Sign to give permission:* ________________________________

☐ *No, please don't post my grades.*

1) (12 points) Evaluate the indicated derivatives of the following functions. **Do not simplify**.

a) $g(t) = \frac{t^2+2}{5t+7}$

$g'(t) =$

b) $y = e^z \ln z \sqrt{z+1}$

$\frac{dy}{dz} =$

c) $f(x) = [1 + (\ln x)^3]^5$

$f'(x) =$

2. (14 points) Consider the function $z = f(x, y) = -x^3 + 12xy - 4y^2 + 3y + 15$.

a) (4pts) Write out the two partial derivatives, $f_x(x, y)$ and $f_y(x, y)$. You need not show work.

$f_x(x, y) =$ ________________________________

$f_y(x, y) =$ ________________________________

b) (5 pts) Find the largest value of the function $f(x, 1)$ over the interval from $x = 0$ to $x = 3$.

Show all steps.

Answer: ____________________________

d) (5 pts) Which graph is steeper:

i. the graph of the function $f(3, y)$ at $y = 4$ OR

ii. the graph of the function $f(x, 1)$ at $x = 2$?

Show all work.

Answer: ________________________ is steeper

3. (12 points)

Suppose that in order to achieve monthly sales of q thousand Items you have to sell your Items at a **price**

$$\boldsymbol{p(q) = q^2 - 25q + 150} \text{ (dollars per Item)}$$

a) Determine all quantities for which your demand curve $p(q)$ is decreasing and not negative.
   Justify your answer.

Answer: from q =_______ to q =_________ thousand Items.

b) Find all the critical points for your **Total Revenue** function. Round your answers to 2 decimal digits.

Answer: TR has critical points at q = ____________________________thousand Items

c) Use the Second Derivative Test to determine whether each of the critical points you found in part (b) is a local maximum or a local minimum for the total revenue. Show all work and circle your answers.

4. (12 pts) The constraints for a linear programming problem are: $2x + 4y \leq 12$ and $x + 5y \leq 10$.

a) Sketch the two constraints and label the feasible region.

b) Find the coordinates (x, y) of all the vertices of the feasible region.

Answer: $(x, y) =$ ____ *(list all vertices)*

(c) Subject to the given constraints, find the maximum value of the following objective function:

$$f(x, y) = 6x - 3y$$

Answer: max $f(x, y) =$_______________