NAME_____

Math 12
Test 4
Spring 2012

You have 50 minutes to complete this test. You must *show all work* to receive full credit. Work any 6 of the following 7 problems. Clearly **CROSS OUT** the problem you do not wish me to grade. Each problem is worth 16 points, and you get 4 points for free, for a total of 100 points. The answers will be posted on the electronic reserves later today.

1. Find the area of the region bounded by the curves $y = 4x$ and $y = x^3 + 3x^2$. Be sure to sketch a graph first!

2. Find all four second-order partial derivatives of $f(x, y) = x^2 y e^x + 2x^3 y^2$. Do NOT simplify.

3. Find and classify the critical points of $f(x,y) = x^3 + y^2 - 6xy + 9x + 5y + 2$.

4. Suppose product A and product B are ***competitive***.

a) If the price of product A goes up, the demand for product A will go _____.

b) If the price of product A goes up, the demand for product B will go _____.

c) Two products that might behave this way are _____ and _____.

Suppose product A and product B are ***complementary***.

d) If the price of product A goes up, the demand for product A will go _____.

e) If the price of product A goes up, the demand for product B will go _____.

f) Two products that might behave this way are _____ and _____.

5. On a single plane, sketch and label 3 level curves of the surface $z = xy$.

6. Calculate $\int_1^{\infty} e^{1-x} dx$.

7. According to postal regulations, the girth (distance around) plus the length of parcels sent by 4^{th} class mail may not exceed 108 inches. What is the largest possible volume of a rectangular parcel with two square sides that can be sent by 4^{th} class mail?