

MATH 112
Exam II
May 15, 2008

Name _____

Student ID # _____

Section _____

HONOR STATEMENT

“I affirm that my work upholds the highest standards of honesty and academic integrity at the University of Washington, and that I have neither given nor received any unauthorized assistance on this exam.”

SIGNATURE: _____

1	20	
2	18	
3	12	
Total	50	

- Please check that your exam contains 3 problems.
- Please turn your cell phone OFF and put it away for the duration of the exam.
- Unless otherwise indicated, you must show your work. Clearly label lines and points that you are using and show all calculations. The correct answer with no supporting work may result in no credit.
- If you use a guess-and-check method when an algebraic method is available, you may not receive full credit.
- Put your name on your sheet of notes and turn it in with the exam.

GOOD LUCK!

1. (20 points)

(a) Compute the derivative. Do not simplify.

i. $A(t) = (6t^3 + \ln t)^7 + \ln(t + e^t)$

ii. $z = \frac{e^{4x}}{\sqrt{x^2 + 3x}}$

(b) Let $f(x, y) = x^4y^3 - 3xy^2 + 4x^5 - \frac{6}{y^2} + (e^{x^3-x})(\ln y)$. Consider the three functions $f(1, y)$, $f(0, y)$, and $f(-1, y)$. Use a partial derivative to determine which of these functions has the steepest graph at $y = 1$.

ANSWER: (circle one) $f(1, y)$ $f(0, y)$ $f(-1, y)$
has the steepest graph at $y = 1$

2. (18 points) You sell Items. The total revenue and total cost (in **thousands of dollars**) for selling q **thousand Items** are

$$TR(q) = \frac{2}{3}(q + 25)^{3/2} - \frac{250}{3} \quad TC(q) = \frac{1}{12}q^2 + 3q + 10.$$

- (a) Find the positive quantity at which marginal revenue is equal to marginal cost.

ANSWER: $q =$ _____ thousand Items

- (b) Let $P(q)$ denote the profit for selling q thousand Items. Find formulas for $P(q)$, $P'(q)$ and $P''(q)$.

ANSWER: $P(q) =$ _____

$P'(q) =$ _____

$P''(q) =$ _____

- (c) Use the Second Derivative Test to determine whether the quantity you found in part (a) gives a local maximum or local minimum of $P(q)$.

- (d) Recall that average cost is given by $AC(q) = \frac{TC(q)}{q}$. Determine whether average cost is concave up or concave down at $q = 50$. Show all your work.

ANSWER: (circle one) concave up concave down

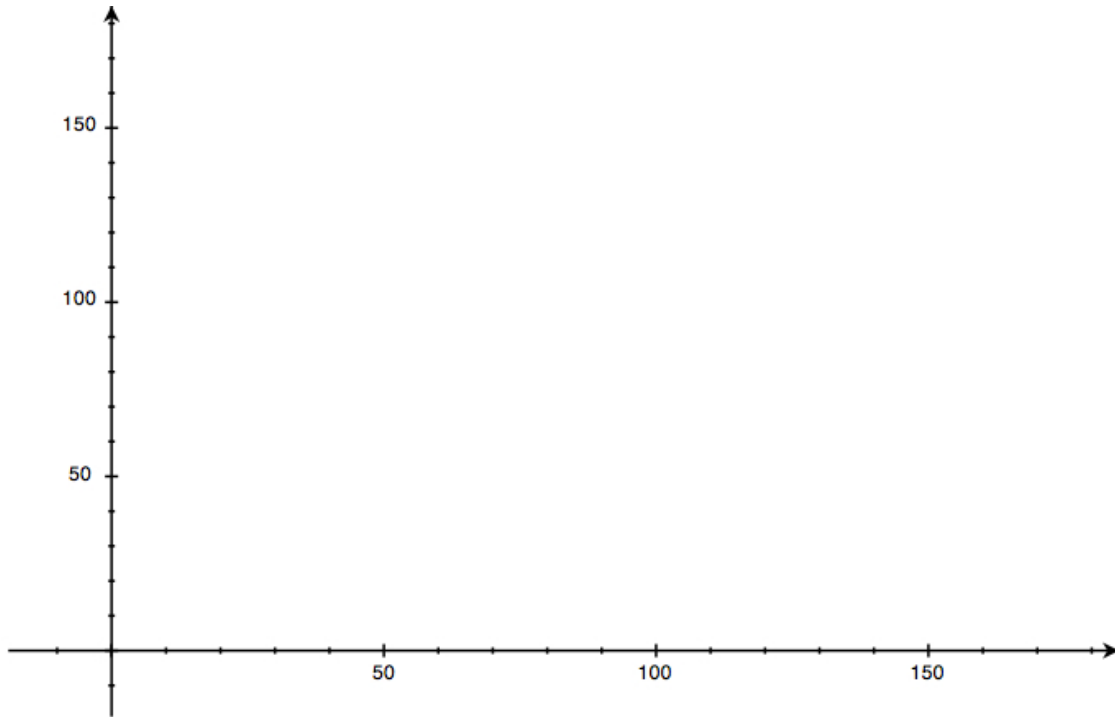
3. (12 points) You sell ceramic monkeys and ceramic giraffes. If x is the number of monkeys you sell and y is the number of giraffes, then your profit (in dollars) is given by the function

$$P(x, y) = 5x + 4y.$$

Use the method of linear programming to find the maximum possible profit, subject to the constraints:

- $10x + 45y \leq 1800$;
- $13x + 7y \leq 795$; and
- $x \leq 52$.

Show all your work.



ANSWER: \$_____