

MATH 112
Exam II
February 26, 2009

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	15	
2	18	
3	17	
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 or read a value from a graph on your calculator when an algebraic method is available, you may not receive full credit.

GOOD LUCK!

1. (15 points)

(a) Compute the derivative. DO NOT SIMPLIFY.

i. $v = e^{10u} \cdot \ln(u^3 + u^2)$

$$\frac{dv}{du} =$$

ii. $g(t) = \left(\frac{4}{15t} + 1\right)^{2/3}$

$$g'(t) =$$

(b) Suppose $P(x, y) = x^3y + xy^2 - 3xy + 4x$.

Which graph is steeper: (A) $P(2, y)$ at $y = 5$; or (B) $P(x, 5)$ at $x = 2$?

ANSWER: circle one (A) (B)

2. (18 points) The demand curve for Trinkets has the formula

$$p = h(q) = 15 - 4\sqrt{q},$$

where q is measured in Thousands of Trinkets and price p is measured in Dollars per Trinket. You also know that variable cost to produce q Thousand Trinkets is given by the formula:

$$VC(q) = 2q,$$

where VC is measured in Thousands of Dollars.

- (a) Write out formulas for total revenue, $TR(q)$, and its derivative, $TR'(q)$.

ANSWERS: $TR(q) =$ _____

$TR'(q) =$ _____

- (b) Find all critical numbers of $TR(q)$.

ANSWER: $q =$ _____

- (c) Use the Second Derivative Test to determine whether your answer(s) to part (b) give a local maximum or local minimum of $TR(q)$.

(THIS PROBLEM IS CONTINUED ON THE NEXT PAGE.)

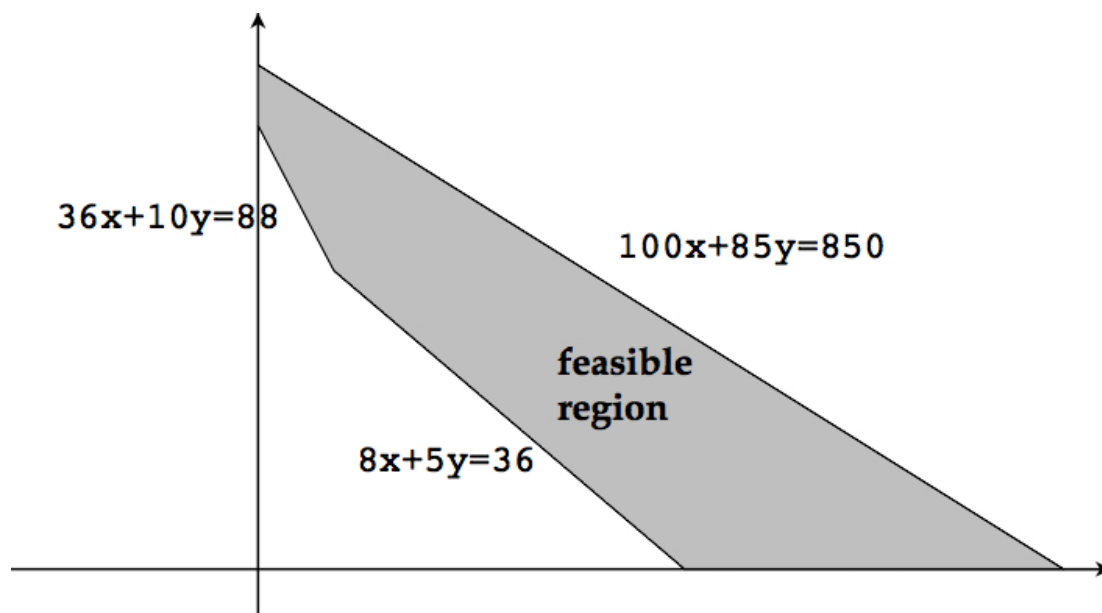
- (d) Find the quantity that maximizes profit. (HINT: Profit is maximized at a quantity at which marginal revenue is equal to marginal cost.)

ANSWER: $q =$ _____ Thousand Trinkets

- (e) If you sell 1 Thousand Trinkets, then your profit is 5.84 Thousand Dollars. What is the value of your fixed cost?

ANSWER: $FC =$ _____ Thousand Dollars

3. (17 points) A linear programming problem has three constraints: $36x + 10y \geq 88$, $8x + 5y \geq 36$, and $100x + 85y \leq 850$. The feasible region is shown in the graph below:



Find the exact coordinates of the five vertices of the feasible region and use them to find the smallest and largest values of the objective function

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

subject to these constraints.

ANSWER: smallest: _____

largest: _____