

ECONOMICS 207
SPRING 2006
EXAM 2

Problem 1 (18 Points).

Find the derivatives of each of the following functions with respect to x .

(i) $y = 10x^3 - 5x^2 + \ln(x) - 4x + 5$

(ii) $y = (2x - 5x^2)(6x^2 - 2)$.

(iii) $y = \frac{2x^5 + 4x^3 - 11x}{4x^2}$

$$(iv) y = \ln [(2x^{-3} + 7x)^5 + 2e^{3x}]$$

$$(v) y = 15x^{5/8} - 25x$$

$$(vi) y = 9x^4 e^{7x^5 - 3x + 2}$$

Problem 2 (16 Points).

Solve the following system of equations for x_1 , x_2 , and x_3 .

$$x_1 - 3x_2 + 2x_3 = -5$$

$$3x_1 - 7x_2 - 2x_3 = 9$$

$$-x_1 + 4x_2 - 5x_3 = 3$$

Problem 3 (15 points).

Solve the following system of equations.

$$30 x_1^{-2/3} x_2^{1/3} - 10 = 0$$

$$20 x_1^{1/3} x_2^{-2/3} - 25 = 0$$

Problem 4 (15 points). Find the profit maximizing level of output for a firm who faces output price, p , and has the following cost function.

$$\text{price} = p = 400$$

$$\text{cost} = c(y) = 300 + 300y - 25y^2 + 2y^3$$

Problem 5 (20 Points).

In the following problem you are given a production function for a firm where y is the variable representing the level of output and x is the level of the variable input. Assume that the price of output for this firm is price = $p = 1$. Assume that the price of the input = $w = 85$. The function representing output as a function of input is given by

$$\text{output} = y = f(x) = 210x + 35x^2 - x^3$$

- (i) Write a function representing the revenue of the firm as a function of price and input level.

Revenue =

- (ii) Write a function representing the cost of the firm as a function of input price and input level.

Cost =

- (iii) Write a function representing the profit of the firm as a function of input price, output price and input level.

Profit =

- (iv) Find the profit maximizing level of input, x .