

ECONOMICS 207
FALL 2006
PROBLEM SET 5

Problem 1. Find the second derivative of each of the following functions with respect to x

(i) $y = 160x^{1/4}z^{3/5} - 45x - 35z$

(ii) $f(x) = 9x^3e^{3x^2-x}$

Problem 2. Find the definite integral of each of the following functions.

(i) $\int_0^9 (9x^2 - 12x + 100) dx$

(ii) $\int_{27}^{64} (50x^{-1/3}z^{1/5} - 16) dx, \quad z = 243.$ (When you are done evaluating the integral, plug in $z = 243$ to get a number)

Problem 3.

- (i) Find the profit maximizing level of output for the following firm. Demonstrate that the level you choose maximizes profit.

$$\text{price} = p = \$392$$

$$\text{cost} = c(y) = 300 + 200y - 12y^2 + 2y^3$$

- (ii) What is revenue minus variable cost for this firm when price is \$392?

- (iii) Find producer surplus for this firm assuming you are only given the following marginal cost function: $MC(y) = 200 - 24y + 6y^2$ and a price of \$392.

Problem 4.

- (i) Find the profit maximizing level of output for the following firm. Demonstrate that the level you choose maximizes profit.

$$\text{price} = p = \$769$$

$$\text{cost} = c(y) = 500 + 400y - 20y^2 + 3y^3$$

- (ii) What is revenue minus variable cost for this firm when price is \$769?

- (iii) Find producer surplus for this firm assuming you are only given the following marginal cost function: $MC(y) = 400 - 40y + 9y^2$ and a price of \$769.

Problem 5. For each of the following problems, find the critical points. For each critical point state whether the function is at a relative maximum, relative minimum, or otherwise.

(i) $y = 9x^3 - 27x^2$

(ii) $f(x) = x^2 + \frac{1}{x^2}$

(iii) $f(x) = -3x^5 + 5x^3$

Problem 6. Do the following problems from the book.

(i) Section 9.4

(a) 5

(ii) Section 8.7

You will need to use Theorem 8.7.1 for these problems.

(a) 1a

(b) 1b