

Review Questions for Midterm 2

1. Short Answer Questions:

- (a) Define:
 - i. Normal Good
 - ii. Giffen Good
 - iii. Constant Returns to Scale
 - iv. Factor Demand Function
- (b) A firm uses perfect substitutes technology such that 2 units of labor can produce the same amount of output as 3 units of capital. Suppose price for each unit of labor is \$2, and the price for each unit of capital is \$1. What is the firm's minimum cost needed in producing 90 units of output?
- (c) Suppose the market for corn is perfectly competitive. The market demand for corn is given by: $Y = \frac{100}{p}$, where Y = market demand for corn, and p = market price for corn. Suppose the market price for corn is \$5. Graphically illustrate the demand curve facing an individual firm supplying corn. *Label all axis, and numerically label all intercepts, kinks, if any.*
- (d) Which of the following statements is (are) true?
 - i. Average fixed costs never increases with output
 - ii. Average variable costs can never rise when marginal costs are declining
 - iii. Average costs are always greater than or equal to average variable costs

2. Stacy consumes two goods: x_1 = (ice cream) and x_2 = (pudding). Let (p_1, p_2, m) be the price of ice cream, price of pudding, and Stacy's income, respectively. Stacy's demand functions for the two goods are: $x_1 = \frac{m}{4p_1}$, and $x_2 = \frac{3m}{4p_2}$.

- (a) Is ice cream a normal or an inferior good? *Show your answer rigorously, do not plug in numbers.*
- (b) Is pudding an ordinary or a Giffen good? *Show your answer rigorously, do not plug in numbers.*
- (c) Graphically illustrate the Engel curve for ice cream. *Keep your answer general, and label all axis and slope.*
- (d) Graphically illustrate the inverse demand curve for ice cream. *Keep your answer general, and label all axis.*
- (e) Graphically illustrate the price offer curve for ice cream. *Keep your answer general, and label all axis and associated budget lines.*

3. Joe's Pizzeria produces $y = (\text{Cheese Pizza})$ using two inputs: $x_1 = (\text{flour})$ and $x_2 = (\text{Cheese})$. The technology used to produce the pizzas is: $f(x_1, x_2) = \text{Min}\{\frac{1}{5}x_1, x_2\}$. Let the price for each portion of flour be \$0.50, and the price for each portion of cheese be \$2.00.
- Suppose Joe's Pizzeria wishes to produce 20 pizzas in the least costly way. How many portions of flour (x_1^*) and how many portions of cheese (x_2^*) should be used? *Numeric Answers.*
 - For Joe's Pizzeria, what is the minimum cost required to produce 20 pizzas? *Numeric Answer.*
 - Graphically illustrate the associated Isoquant and Isocost lines that pass through the firm's cost-minimizing choice of inputs (x_1^*, x_2^*) in producing 20 pizzas. *Label each line separately. And make sure you label all axis, intercepts, and kinks, if any.*
4. A firm uses two inputs, (x_1, x_2) to produce its one output (y) using the technology: $f(x_1, x_2) = x_1^{\frac{1}{2}}x_2^{\frac{1}{3}}$. Let (p, w_1, w_2) be the per unit price of output, input one, and input two, respectively.
- In the short run, the amount of input two is fixed at 1 unit. Solve for the firm's short-run profit maximizing choice of input one.
 - Determine whether the technology exhibits increasing, decreasing, or constant returns to scale. *Show your answers analytically, do not plug in numbers.*
 - Suppose now the firm is operating in the long run. Solve for the firm's long-run profit-maximizing choice of both inputs.
 - Suppose the firm wishes to produce \bar{y} units of output in the least costly way. Solve for the firm's cost-minimizing choice of both inputs.
5. A perfectly competitive, profit-maximizing firm faces the following total cost function:
 $C(y) = y^4 - 3y^2 + 9y + 10$.
- Derive the firm's variable cost function ($C_v(y)$), fixed cost function (F), and the marginal cost function ($MC(y)$).
 - Verify that the firm's marginal cost curve ($MC(y)$) intersects the average variable cost curve ($AVC(y)$) at the minimum of the average variable cost curve ($AVC(y)$).
 - At what price range would this firm choose to shut down? *Numeric ranges.*
 - Suppose the firm is currently supplying 2 units of output. Calculate the firm's profit and the producer's surplus.