McPeak Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

PAI 723

Exam 2 Fall 2017

All numbered questions are worth 2 points each, sub questions worth an equal share of these 2 points.

1) Complete the following table.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Output | Fixed Cost | Total Cost | Variable Cost | Marginal Cost | Average Cost | Average Variable Cost |
| 0 |  8 |   |  | NA | NA | NA |
| 1 |  |   |  |  |  | 15 |
| 2 |  |  37 |  |  |  |  |
| 3 |  |   | 42 |  |  |  |
| 4 |  |  |  | 15 |  |  |
| 5 |  |  | 74 |  |  |  |
| 6 |  | 100 |  |  |  |  |
| 7 |  | 120 |  |  |  |  |
| 8 |  |  |  |  | 18 |  |

a) Is this a short run or long run information on cost? Why?

1. If the price of the good produced is currently 15, what level of output meets the profit maximizing condition?
2. Draw a figure illustrating the average cost, the average variable cost, and the marginal cost curves based on the information in this table.
3. Production and cost functions. (2 points)
	1. Q=f(L, $\overbar{K}$) is the production function. Define the marginal product of labor and the average product of labor for this production function.
	2. Explain why this production function will exhibit diminishing marginal product as L increases.
	3. If the cost of the input of labor L is $10 per unit, calculate the cost of producing each level of output, and the marginal cost for changing the output level.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Input level L | Output level Q | Cost of producing Q | Change in Q | Change in cost | Marginal Cost |
| 0 | 0 | 0 | NA | NA | NA |
| 1 |  8 |  |  |  |  |
| 2 | 20 |  |  |  |  |
| 3 | 31 |  |  |  |  |
| 4 | 41 |  |  |  |  |
| 5 | 50 |  |  |  |  |
| 6 | 58 |  |  |  |  |
| 7 | 65 |  |  |  |  |
| 8 | 71 |  |  |  |  |
| 9 | 76 |  |  |  |  |

1. Circle the correct answer.

|  |  |
| --- | --- |
| **Statement** | **The statement is** **(circle the correct answer)** |
| A Stackelberg leader is the only purchaser of a good for which there are many suppliers. | True False |
| An isoquant traces out all combinations of inputs that generate a given level of output in a technologically efficient way. | True False |
| A monopolist is a price taker. | True False |
| If where price = MC(q), price is greater than average variable cost, the firm should shut down and produce q=0 in the short run. | True False |
| Marginal cost = cost of the input / marginal product. | True False |
| The slope of the isocost line is defined by the negative ratio of the marginal product of labor and the marginal product of capital. | True False |
| According to the last dollar rule, the marginal products of capital and labor should be equal at the economically efficient point | True False |
| The expansion path traces out input bundles that are defined as the profit maximizing level of q in response to market price p. | True False |

4) You are given the following information on the relationship between inputs and production level at various points.

|  |  |  |  |
| --- | --- | --- | --- |
| Points | Labor | Capital | Output |
| A |  1 |  2 |  12 |
| B |  2 |  4 |  28 |
| C |  4 |  8 |  56 |
| D |  8 |  16 |  110 |
| E |  16 |  32 |  200 |

a. Illustrate these points using isoquants.

b. Contrast the returns to scale implied by movement between the points. (circle the correct answer)

From A to B I have (increasing, constant, decreasing) returns to scale.

From B to C I have (increasing, constant, decreasing) returns to scale.

From C to D I have (increasing, constant, decreasing) returns to scale.

From D to E I have (increasing, constant, decreasing) returns to scale.

5) You know that the demand curve is defined by the following function: P=66-3\*Q.

* 1. Use the bisection rule to define the marginal revenue curve
	2. If total cost is defined by 6\*Q, then you know MC is 6 for all possible levels of Q. What is the value of Average Cost? Explain.
	3. At what Q do marginal cost and marginal revenue cross?
	4. What is the selling price for a monopolist?
	5. Why is the firm not better off setting Q=0 and shutting down rather than producing at the Q you noted in (c)? Explain your reasoning briefly
1. Continue with the demand curve from (5) and the MC=6 supply curve. Assume the market for this commodity was to become a perfectly competitive market for some reason.
	1. What are the market price and amount of quantity in the market if all firms in the competitive market had identical cost structures to the monopoly firm (MC=6) and the demand curve was unchanged?
	2. Show the competitive case in comparison to the monopoly case on a single graph.
	3. Calculate the values to fill in the table.

|  |  |  |
| --- | --- | --- |
|  | Monopoly | Perfect Competition |
| Consumer Surplus |  |  |
| Producer Surplus |  |  |
| Deadweight Loss |  |  |
| Total Social Welfare |  |  |

7) Production.

a) Q=f(L, $\overbar{K}$) is the production function with L as labor and K as a fixed level of capital. Draw this production function from the side view and illustrate areas that are: technologically infeasible, technologically efficient, and technologically inefficient.

b) Q=f(L,K) is the production function with both labor and capital variable. Draw an isoquant for the quantity Q1 and illustrate areas that are: technologically infeasible for producing Q1, technologically efficient for producing Q1, and technologically inefficient for producing Q1.

c) Illustrate how technological progress would affect a production function like the one you drew in part (a).

8) Assume the rental rate of capital is 2 and the wage rate is 4.

* 1. Draw an isocost curve for a total cost level of 160 and an isoquant that is tangent to this isocost.
	2. We are at a point on this isocost that is tangent to an isoquant. If the marginal product of labor is 2, what is the marginal product of capital at an economically efficient point? Why?
	3. What is the formula for and value of the Marginal Rate of Technical Substitution for the point on the isoquant described in part b?

9) Circle the correct answer

|  |  |  |
| --- | --- | --- |
| Condition A | Condition B | What type of condition is B for establishing A? |
| MC is above AC at q | AC is upward sloping at q | N, NS S, NN N,S |
| The commodity in the market is homogeneous | The market is perfectly competitive | N, NS S, NN N,S |
| The market is perfectly competitive | The commodity in the market is homogeneous | N, NS S, NN N,S |
| The quantity q’ is produced in an economically efficient way | Profit is maximized at quantity q’ | N, NS S, NN N,S |
| A quantity is the profit maximizing quantity | The quantity is produced in a technologically efficient way. | N, NS S, NN N,S |
| The last dollar rule is satisfied at a bundle | MRS=MRT at a bundle | N, NS S, NN N,S |
| Output doubles when inputs double | The firm is experiencing constant returns to scale | N, NS S, NN N,S |
| The point defined by the input bundle (K,L) satisfies w\*L+r\*K=C | The point defined by the input bundle (K,L) lies on the expansion path | N, NS S, NN N,S |

N,NS : Necessary, not sufficient

S, NN: Sufficient, not necessary

N, S: Necessary and sufficient.

10) Circle the correct answer for each.

* + 1. In a perfectly competitive market the area corresponding to producer surplus is the area:
			1. Below the demand curve and above the price line to the left of the optimal quantity.
			2. Above the demand curve and below the supply curve to the right of the optimal quantity.
			3. Above the supply curve and below the price line to the left of the optimal quantity.
			4. Below the supply curve and above the x –axis to the left of the optimal quantity.
		2. A Natural Monopoly:
			1. Is the only purchaser of a good for which there are many sellers.
			2. Has first mover status due to some structural feature of decision making that allows them to move first and their competitors then react.
			3. Is regulated by a price ceiling where the ceiling is defined at the price at which the marginal willingness to pay curve crosses the marginal cost curve.
			4. Is characterized by marginal cost values below average cost values for the entire range of the demand curve.
		3. A monopolist:
			1. Chooses a price-quantity pair according to a best response function defined in terms of reactions to a competitor in the market.
			2. Is the only supplier of a good for which there is no close substitute.
			3. Is the only person named Polly in a class.
			4. Is the only buyer of a good which has multiple suppliers.
		4. The long run supply curve for the individual firm in a perfectly competitive market is:
			1. The marginal cost curve at and above the point where AC(Q)=MC(q), q=0 elsewhere.
			2. The average fixed cost curve at and above the average cost curve, q=0 elsewhere.
			3. The inverse of the industry supply curve.
			4. The horizontal summation of the price-quantity pairs that define the price-consumption curve.

Work Page