McPeak   Name:_____

PAI 897

Exam 2 Fall 2020

All numbered questions are worth 1.5 points each, sub questions worth an equal share of these 1.5 points.

1) Complete the following table.

Output	Fixed Cost	Total Cost	Variable Cost	Marginal Cost	Average Cost	Average Variable Cost
0	10			NA	NA	NA
1						15
2			27			
3		52				
4					17	
5				17		
6		103				
7			113			
8		149				

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

b) If the price of the good produced is currently 20, what level of output meets the profit maximizing condition?

c) Draw a figure illustrating the average cost, the average variable cost, and the marginal cost curves based on the information in this table.

2) Production and cost functions.

   a. Q=f(L, $\bar{K}$) is the production function. Define the marginal product of labor and the average product of labor for this production function.

   b. If the cost of the input of labor L is $7 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				

   c. Draw and briefly explain the shape of the marginal cost that you see in the table above.

3) Circle the correct answer.

Statement	The statement is (circle the correct answer)	
In the long run, producer surplus equals profit in a perfectly competitive market.	True	False
An isocost traces out all combinations of inputs that generate a given level of output in a technologically efficient way.	True	False
Producers in a perfectly competitive market are price takers.	True	False
In the short run, if price = MC(q'), and price is greater than Average Fixed Cost at (q'), the firm should produce q'.	True	False
Marginal cost = cost of the input / marginal product.	True	False
Consumer surplus is the area under the price line and above the supply curve.	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 shape of the isoquant illustrates whether the two inputs are complements or substitutes in production of q.	True	False

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

Points	Capital	Labor	Output
A	3	2	10
B	6	4	24
C	12	8	50
D	24	16	100
E	48	32	185

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.
    a. Use the bisection rule to define the marginal revenue curve

    b. 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.

    c. At what Q do marginal cost and marginal revenue cross?

    d. What is the selling price for a monopolist?

    e. 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

6) 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.

    a. 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?

    b. Show the competitive case in comparison to the monopoly case on a single graph.

    c. Calculate the values to fill in the table.

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

7) Externalities.

a) Draw a graph when there is a negative externality generated as a by-product of production. Identify the perfectly competitive market outcome and contrast it to the socially optimal outcome. Illustrate the deadweight loss of the competitive market outcome.

b) Draw a graph when there is a positive externality generated as a by-product of consumption. Identify the perfectly competitive market outcome and contrast it to the socially optimal outcome. Illustrate the deadweight loss of the competitive market outcome.

8) Assume the rental rate of capital is 8 and the wage rate is 5.

    a. Draw an isocost curve for a total cost level of 80 and an isoquant that is tangent to this isocost.

    b. We are at a point on this isocost that is both technologically and economically efficient. If the marginal product of capital is 8, what is the marginal product of labor at this point? Why?

    c. The Marginal Rate of Technical Substitution is the slope of which curve in part a?

9) Game Theory

		American Airlines			
		$q_{AA} = 65$		$q_{AA} = 47$	
United Airlines	$q_{UA} = 65$	4.2	4.2	5.3	3.9
	$q_{UA} = 47$	3.9	5.3	4.6	4.6

a. Define the best response functions for American Airlines and United Airlines.

b. What is the Nash Equilibrium of this game?

10) Public goods

The city of Syracuse is trying to decide how many cans of white spray paint to buy to create six-feet wide social distancing circles in city parks. There are three residents in the city of Syracuse. John has a Marginal Willingness to Pay (MWTP) curve defined by $MWTP_J = 6.00 - 0.10 * q$. Tina has a MWTP curve defined by $MWTP_T = 4.00 - .20 * q$. Peg has a MWTP curve defined by $MWTP_P = 4.20 - 0.10 * q$. A can of white spray paint costs $5.00.

    a. If no effort is made to solve the free-rider problem, how many cans of spray paint will be purchased and who will purchase them?

    b. What is the socially optimal number of cans of spray paint that should be provided?

    c. Draw your answers to parts a and b.

Work Page