

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	20			NA	NA	NA
1						15
2		49				
3			44			
4				17		
5					20	
6				24		
7					22	
8		192				

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

- b) If the price of the good produced is currently 19, 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. Explain your answer to (b) in reference to this graph.

2) Production and cost functions. (2 points)

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. Explain why this production function will exhibit diminishing marginal product as L increases.

c. If the cost of the input of labor L is \$5 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	13				
2	25				
3	36				
4	46				
5	55				
6	63				
7	70				
8	76				
9	81				

3) Circle the correct answer.

Statement	The statement is (circle the correct answer)	
The slope of the total cost curve is called the marginal rate of technical substitution.	True	False
Producer surplus is calculated as the area under the demand curve and above the price line.	True	False
In a perfectly competitive market the firm is a price taker.	True	False
If where price = MC(q), price is less than average variable cost, the firm should shut down and produce q=0 in the short run.	True	False
Marginal cost = total of the input / marginal product.	True	False
The bisection rule allows us to derive the marginal cost curve from a linear demand curve.	True	False
According to the last dollar rule, the marginal products of capital and labor should be equal.	True	False
The expansion path traces out input bundles that maximize output for given cost levels.	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	10	20	200
B	20	40	500
C	40	80	1000
D	80	160	1800
E	160	320	2500

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: $P=80-5*Q$.

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

b. If total cost is defined by $10*Q$, then you know MC is 10 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

7) Production.

a) $Q=f(L, \bar{K})$ is the production function with L as labor and K as a fixed level of capital. Draw this production function 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 Q_1 and illustrate areas that are: technologically infeasible for producing Q_1 , technologically efficient for producing Q_1 , and technologically inefficient for producing Q_1 .

c) $Q=f(L,K)$ is the production function with both labor and capital variable. Use this production function to illustrate the concepts of constant and decreasing returns to scale.

- 8) Assume the rental rate of capital is 4 and the wage rate is 6.
- a. Draw an isocost curve for a total cost level of 120.

b. If the marginal product of labor is 3, what is the marginal product of capital at an economically efficient point? Why?

c. What values define the slope of an isocost?

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 good is homogeneous	The market is perfectly competitive	N, NS S, NN N,S
The market is perfectly competitive	The good is homogeneous	N, NS S, NN N,S
You can get to NYC from Syracuse in less than six hours.	There is a bus to NYC from Syracuse that makes the trip in less than six hours.	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 $w \cdot L + r \cdot K = C$	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) Supply curves and firm costs.

a. Illustrate where we find the firm specific supply curves for two firms who differ in costs in the short run. Note for each firm average fixed costs, average variable costs, average costs, and marginal costs. Use two graphs, side by side, one for each firm.

b. Explain how these individual firm supply curves aggregate to become the market supply curve.

c. Explain the concept of producer surplus based on your answers to a and b.

