

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 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 \$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	11				
2	21				
3	30				
4	38				
5	45				
6	51				
7	56				
8	60				
9	63				

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 fixed 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 bisection rule allows us to derive the marginal cost curve from a linear demand curve.	True	False
A monopsonist is the single buyer of a good for which there is no close substitute.	True	False
The expansion path traces out the cost minimizing input bundles for producing different levels of output.	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	20
B	2	4	50
C	4	8	100
D	8	16	200
E	16	32	300

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

- 6) Continue with the demand curve from (5) and the $MC=10$ 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 ($MC=10$) and the demand curve was unchanged?
 - b. Show the competitive case in comparison to the monopoly case on a single graph.

- c. Calculate the area in numbers of consumer surplus, producer surplus, and total social welfare under the competitive and the monopoly structure.

	Competitive Market Structure	Monopoly Market Structure
Consumer Surplus		
Producer Surplus		
Total Social Welfare		

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 this as an isoquant for the quantity Q_1 and illustrate areas that are: technologically infeasible, technologically efficient, and technologically inefficient.

c) $Q=f(L,K)$ is the production function. Draw this as an isoquant for the quantity Q_1 and illustrate how this isoquant is impacted by neutral technological progress.

- 8) Assume the rental rate of capital is 3 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 4, 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 more than doubles when inputs double	The firm is experiencing increasing 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) Isoquant and Isocost lines.

a. Derive the expansion path graphically, using isoquant and isocost curves.

b. Illustrate how a total cost curve can be derived from your graph in (a).

c. Describe how to calculate the marginal cost curve and the average cost curve from the graph in b.