



# Introduction to Microeconomics

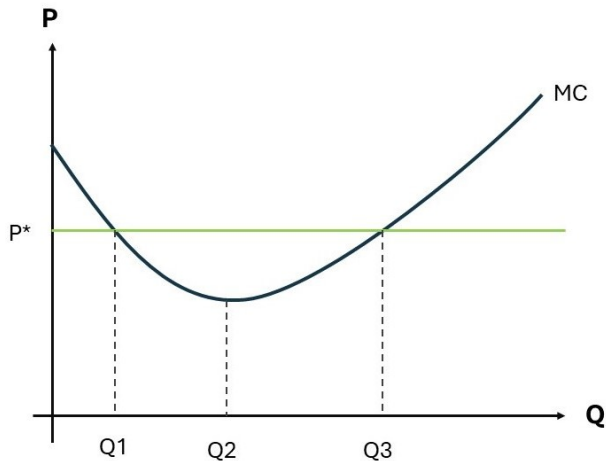
Week 11

TA: Arti Agarwal

IIT Kanpur

April 9, 2024

## Question 1



The diagram represents a perfectly competitive market. At which point does the given firm in this market maximize its profit?

- A)  $Q_1$
- B)  $Q_2$
- C)  $Q_3$
- D) None of the above

## Question 2

For the same firm (as Q1), which of the following are true for its profit maximization?

- A)  $P = MC(Q_2)$  at point of profit maximization
- B)  $P = MC(Q_3)$  at point of profit maximization
- C)  $P = AVC(Q_3)$  for profit maximization
- D)  $P \geq AVC(Q_3)$  for profit maximization
- E)  $P > AVC(Q_2)$  for profit maximization

### Question 3

Quantity	FC	MC	AVC
1	10	8.0	8.0
2	10	7.2	7.7
3	10	6.8	7.3
4	10	5.5	6.8
5	10	4.0	6.5
6	10	5.5	6.2
7	10	6.0	6.0
8	10	7.0	6.3
9	10	7.5	6.6
10	10	8.5	7.1

Consider a firm in a perfectly competitive market with the cost structure given by the table. At price  $P = 5.5$  the firm will:

- A) produce  $q = 6$
- B) produce  $q = 4$
- C) shut down
- D) indeterminate

## Question 4) i)

Suppose there are 2 firms in an industry. Firm 1 produces with the total cost function  $TC_1 = 100 + 2q^3 - 4q^2 + 50q$ . Firm 2 produces with the total cost function  $TC_2 = 100 + 2q^3 - 8q^2 + 20q$ . Assume perfect competition. Find the supply functions of both firms in the short run. [Schotter Chapter 14, Ex 4]

- A)  $q_{S1} = \sqrt{\frac{P-47.33}{6}} + 0.667$ ;  $q_{S2} = \sqrt{\frac{P-9.33}{6}} + 1.333$
- B)  $q_{S1} = \sqrt{\frac{P-53.33}{6}} + 0.667$ ;  $q_{S2} = \sqrt{\frac{P-9.33}{6}} + 1.333$
- C)  $q_{S1} = \sqrt{\frac{P-48}{6}} + 0.667$ ;  $q_{S2} = \sqrt{\frac{P-12}{6}} + 1.333$
- D) None of the above

## Question 4) ii)

Suppose there are 2 firms in an industry. Firm 1 produces with the total cost function  $TC_1 = 100 + 2q^3 - 4q^2 + 50q$ . Firm 2 produces with the total cost function  $TC_2 = 100 + 2q^3 - 8q^2 + 20q$ . Assume perfect competition. At price  $P = 25$  what is the short run market supply? At  $P' = 55$  what is the short run market supply?

- A)  $Q = 2.94, Q' = 5.889$
- B)  $Q = 2.94, Q' = 4.092$
- C)  $Q = 0, Q' = 5.889$
- D) None of the above

## Question 5

Given that a competitive firm's short-run cost function is

$C(q) = 100q - 4q^2 + 0.2q^3 + 450$ , what is the firm's short-run supply curve?

If the price is  $p = 115$ , how much output does the firm supply?

What is the firm's producer surplus at this price?

[Perloff Solved Problem 8.3]

## Question 6

Suppose production function of a firm using  $z_1$  and  $z_2$  as the two inputs is  $f(z_1, z_2) = \sqrt{z_1 + z_2}$ . What is the supply function for this firm if input price for  $z_1$  is greater than input price for  $z_2$ ? Assume price for final good  $q$  as numeraire ( $p=1$ ).

- A)  $q = \frac{1}{4w_1}$
- B)  $q = \frac{1}{4\sqrt{w_1 + w_2}}$
- C)  $q = \frac{1}{w_1 + w_2}$
- D)  $q = \frac{1}{2w_2}$



## Question 7

For the firm in Q6, what is the profit function of the firm?

A)  $\pi(p, w) = \frac{1}{4w_2}$

B)  $\pi(p, w) = \frac{1}{2w_1}$

C)  $\pi(p, w) = \frac{1}{4\sqrt{w_1 + w_2}}$

D)  $\pi(p, w) = \frac{1}{4w_1 + 2w_2}$

## Question 8

A firm has a cost function  $C = q^3 - 36q^2 + 490q + 1000$ . The firm is a price taker and faces a market price of  $p = 250$  in perfectly competitive market. Should the firm operate or shut down at given market price?

[Perloff Chapter 8, Ex 3.17]

## Question 9

Each of the 10 firms in a competitive market has a cost function of  $C = 25 + q^2$ . The market demand function is  $Q = 120 - p$ .

Determine the equilibrium price, quantity per firm, and market quantity.

Find the firm's profit function. What is each firm's profit at equilibrium price?

[Perloff Chapter 8, Ex 3.14]

## Reference Reading

1. *Workouts in Intermediate Microeconomics 6e* by Hal Varian
2. *Microeconomics: A Modern Approach* by Andrew Schotter
3. *Microeconomics 9e* by Pindyck and Rubenfield
4. *Microeconomics* by Jeffrey Perloff