

**Example 2.I:** A monopolist firm faces the market demand given by  $P = 10 - Q$ . Consider the following questions if the cost function  $C(Q) = 4Q$ .

$$y = m x + c$$

- What is the revenue-maximizing level of output?

Revenue function  $TR(Q) = P(Q) \times Q$

$$= (10 - Q) \times Q$$

$$= 10Q - Q^2$$

slope =  $\frac{\partial TR}{\partial Q} = 10 - 2Q$

maximum occurs when  $\frac{\partial TR}{\partial Q} = 0$

$$10 - 2Q = 0$$

$$Q = 5$$

At  $Q = 5$ ,  $TR$  is max  
 $TR = 25$

- What is the break-even output?

$\pi = 0 \rightarrow TR = TC$

$TR = TC$

$$P(Q) \times Q = 4Q$$

$$10Q - Q^2 = 4Q$$

$$6Q = Q^2$$

$$6 = Q$$

Break even at  $q = 6$   
 $p = 4$

- What is the profit-maximizing level of output?

①  $MR = MC$

$$M C(Q) = TC(Q+1) - TC(Q)$$

$$MC = 4Q + 4 - 4Q$$

$$MC = 4 = MR$$

②

$$\pi = TR - TC$$

$$\pi = 10Q - Q^2 - 4Q$$

$$\pi = 6Q - Q^2$$

↓ Dif

$$0 = Q - 2Q$$

$$Q = 3$$