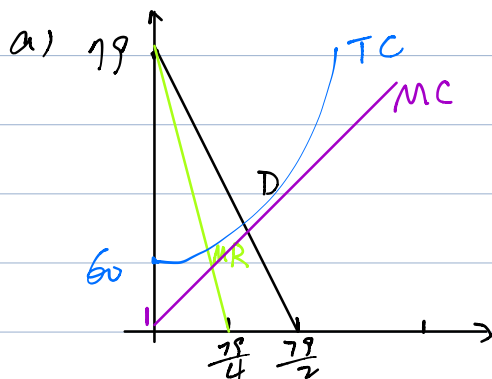


Q3.

Demand Curve : $P = 79 - 2Q$

Supply Curve : $P = -1 + Q = MC(Q)$

$$TR = PQ = (79 - 2Q)Q \rightarrow MR = \frac{\partial R}{\partial Q} = 79 - 4Q$$



b)

$$\text{Let } MR = MC \rightarrow -1 + Q = 79 - 4Q \rightarrow Q_m = 16$$

$$P_m = 79 - 2Q_m = 47$$

c)

$$\pi_m = TR - TC = 47 \times 16 - (60 - 16 + 0.5 \cdot 16^2) = 580$$

d)

$$FC = TC(0) = 60$$

$$VC = -Q + 0.5Q^2$$

e)

$$\text{Let } MC = D \rightarrow -1 + Q = 79 - 2Q \rightarrow Q^* = \frac{80}{3} = 26.7$$

$$P^* = -1 + Q = 25.7$$

Q 4

$$Q(P) = \frac{300}{N} - P \quad TC = 50 + Q^2$$

$$Q(P)|_{N=3} = 100 - P$$

$$a) \quad P = 100 - Q \rightarrow TR = 100Q - Q^2 \rightarrow MR = 100 - 2Q$$
$$MC = \frac{\partial TC}{\partial Q} = 2Q$$

Short-run equilibrium satisfies $MR = MC$

$$\text{This generates } 100 - 2Q = 2Q \rightarrow Q_m = 25, P_m = 50$$

b)

$$\pi_m = TR - TC = 3125 - 675 = 2450$$

c)

To reach the long-run equilibrium, we need $P = MC$

Construct new formulas

$$P = \frac{300}{N} - Q \rightarrow TR = \left(\frac{300}{N}\right)Q - Q^2 \rightarrow MR = \frac{300}{N} - 2Q$$

$$MC = 2Q$$

$$\text{To reach the equilibrium, let } MR = MC, \frac{300}{N} - 2Q = 2Q \rightarrow Q = \frac{75}{N}$$

$$\pi = TR - TC = 0 \text{ to reach long-run equilibrium}$$

$$\rightarrow \left(\frac{300}{N}\right)Q - Q^2 - 50 - Q^2 = 0 \rightarrow N = \pm 15 \rightarrow N = 15$$

There will be 15 companies in total.