first assignment _ 6304640532

① $Q(f) = f^{\epsilon}$

a) Elasticity of demand $E^d = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$

Demand function $Q(P) = P^{\epsilon}$; $P = \sqrt[\epsilon]{Q \cdot P}$

$$\frac{dQ}{dP} = \epsilon P^{\epsilon-1}$$

$$E^d = \frac{dQ}{dP} \times \frac{P}{Q}$$

$$= (\epsilon P^{\epsilon-1}) \times \left(\frac{P}{Q}\right)$$

$$= \frac{(\epsilon P^{\epsilon-1} \times P)}{Q}$$

$$= \frac{\epsilon P^{\epsilon}}{Q}$$

$$= \frac{\epsilon (\sqrt[\epsilon]{Q})^{\epsilon}}{Q}$$

$$E^d = \epsilon$$

b) $MC = 1$, $\epsilon = -2$, find profit maximizing

Profit Maximizing when $MR = MC$

Demand function $P = \sqrt[\epsilon]{Q}$

$$TR = P \times Q$$

$$= (\sqrt[\epsilon]{Q})(Q)$$

$$= (Q^{-\frac{1}{2}})(Q)$$

$$= Q^{\frac{1}{2}}$$

$$MR = \frac{dTR}{dQ} = \frac{1}{2\sqrt{Q}}$$

$$MR = MC$$

$$\frac{1}{2\sqrt{Q}} = 1$$

$$\sqrt{Q} = \frac{1}{2}$$

$$Q = \frac{1}{4}$$

∴ profit maximizing price ; $P = \frac{1}{\sqrt{Q}}$ $P = 2$ //

② demand function $Q(P) = 10 - P$

$MC = 0$

$Q = 5$ / firm

$Q = 0.05$ / 100 firms

Monopoly

Profit maximizing when $MR = MC$

Demand function $Q = 10 - P$, $P = 10 - Q$

$TR = P \times Q$

$TR = (10 - Q)(Q)$

$TR = (10Q - Q^2)$

$MR = \frac{dTR}{dQ} = 10 - 2Q = 0$

$Q = 5$ units = 1 firm

Competitive

Profit maximizing when $MR = P$

$0 = 10 - Q$

$Q = 10$ units = two firms

Yes, Monopoly sells less output than a competitive //

③ Problem 8, Chapter 13

a) Cournot equilibrium firm output

The 1st firm

$\pi_1 = (P \times Q_1) - C_1$

$= 448 - (Q_1 + Q_2)Q_1 - Q_1^2$

$= (448 - Q_1 - Q_2)(Q_1) - Q_1^2$

$= 448Q_1 - 2Q_1^2 - Q_1Q_2$

$\frac{d\pi_1}{dQ_1} = 448 - 4Q_1 - Q_2 = 0$

$Q = \frac{448 - Q_2}{4}$ — (1)

2nd firm

$\pi_2 = (P)(Q_2) - C_2$

$= (448 - (Q_1 + Q_2))Q_2 - Q_2^2$

$= 448Q_2 - Q_1Q_2 - 2Q_2^2$

$\frac{d\pi_2}{dQ_2} = 448 - Q_1 - 4Q_2 = 0$

$Q_2 = \frac{448 - Q_1}{4}$ — (2)

subtituting (2) into (1)

$Q_1 = \frac{448 - \left(\frac{448 - Q_1}{4}\right)}{4}$

$4Q_1 = 448 - \frac{448}{4} + \frac{Q_1}{4}$

$3.75Q_1 = 336$

$Q_1^* = 89.6$; $448 - (89.6 + 89.6)$

$Q_2^* = 89.6$

$P^* = 268.8$

Profit of each firm = $\pi_1 = (448 - (89.6 + 89.6))(89.6) - (89.6)^2$

$\pi_2 = \pi_1 = 16056.32$ //

b) stackelberg equilibrium from output

$P = 118 - Q$, $Q = Q_1 + Q_2$

$P = 448 - (Q_1 + Q_2)$, $C_1 = Q_1^2$, $C_2 = Q_2^2$

$MC_1 = 2Q_1$ $MC_2 = 2Q_2$

1st firm

$TR_1 = P \times Q_1$

$= 448Q_1 - Q_1^2 - Q_1Q_2$

$MR_1 = \frac{dTR_1}{dQ_1} = 448 - 2Q_1 - Q_2$

At profit maximizing $MR_1 = MC_1$

$448 - 2Q_1 - Q_2 = 2Q_1$

$4Q_1 + Q_2 = 448$ — ①

2nd firm

$TR_2 = P \times Q_2$

$= (448 - Q_1 - Q_2)(Q_2)$

$= 448Q_2 - Q_1Q_2 - Q_2^2$

$MR_2 = \frac{dTR_2}{dQ_1} = 448 - Q_1 - 2Q_2$

At profit maximizing $MR_2 = MC_2$

$448 - Q_1 - 2Q_2 = 2Q_2$

$4Q_2 + Q_1 = 448$ — ②

② × 4 ; $16Q_2 + 4Q_1 = 1792$ — ③

③ − ① ; $15Q_2 = 1344$

$Q_2^* = 89.6$

$Q_1^* = 89.6$

$P^* = 448 - (Q_1 + Q_2)$

$= 268.8$

$\pi_1 = \pi_2 = 268.8 \times 89.6$

$= 16,056.32$ //

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A dominant firm is considered as a firm that accounts for a significant share in a given market and also, market share is significantly considered above 40 percent of a whole of market share. Furthermore, a dominant firm basically holds at least 40 percent of total market share, so it is considered as a price maker, or price leadership. An instance of dominant firm is Apple that is a leader of multinational technology company in electronic software industry. Apple computer company holds 60 percent of market share of smartphone industry in 2021.

Meanwhile, a fringe firms ae defined as a group of small enterprises wilh small price taking and they typically follow a dominant firm in a same market. On the other hand, a dominant firm sets a price and fringe firms take it as given. Furthermore, each fringe firm is usually small market share although all fringe firms can have a considerable market share, while it is likely to be less than a dominant firm's market share. The instance of fringe tirms, such as Oppo, Samsung, and Vivo mobile phones.