

① Suppose the demand curve is $Q(p) = p^\epsilon$, what is the elasticity of demand? If marginal cost is \$1 and $\epsilon = -2$, what is the profit-maximizing price?

$$\epsilon_{Q,p} = \frac{\% \Delta Q}{\% \Delta P} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

$$\left\{ \begin{array}{l} Q = p^{-2} \\ \frac{\Delta Q}{\Delta P} = -2p^{-3} \end{array} \right.$$

$$\epsilon_{Q,p} = -2p^{-3} \cdot \frac{P}{p^{-2}} = -2p^{-3} \cdot \frac{1}{p^{-3}} = -2 \quad \#$$

• Profit-maximizing: $MR = MC$

$$MC = 1$$

$$Q = p^\epsilon \rightarrow P = Q^{\frac{1}{\epsilon}} = Q^{-\frac{1}{2}}$$

$$TR = P \times Q = Q \cdot Q^{-\frac{1}{2}} = Q^{\frac{1}{2}}$$

$$MR = \frac{1}{2} Q^{-\frac{1}{2}} = \frac{Q^{-\frac{1}{2}}}{2} = \frac{1}{2 \cdot Q^{\frac{1}{2}}}$$

$$MR = MC$$

$$\frac{1}{2Q^{\frac{1}{2}}} = 1 \quad \frac{1}{Q^{\frac{1}{2}}} = 2 \quad \frac{1}{2} = Q^{\frac{1}{2}} \quad Q = \left(\frac{1}{2}\right)^2 = \frac{1}{4}$$

$$P = \left(\frac{1}{4}\right)^{-\frac{1}{2}} = (4)^{\frac{1}{2}} = 2 \quad \#$$

∴ Elasticity of demand is -2.

Profit-maximizing is 2.

- 2 Suppose the demand curve for corn is $Q(p) = 10 - p$. Suppose that one firm owns all five units of corn in the world and has zero marginal cost. Does a monopoly sell less output than would be sold in a competitive market in which 100 firms each own 0.05 units?

$$Q = 10 - p$$

$$p = 10 - Q$$

$$\bullet \text{ TR} = p \times Q = 10Q - Q^2 \quad \rightarrow \quad \text{MR} = 10 - 2Q \quad \text{MC} = 0$$

$$10 - 2Q = 0$$

$$-2Q = -10 \quad , \quad Q = 5$$

Output sold by each competitive firm is 0.05 units.

Total number of firms are 100 firms.

Total output sold by a competitive firm is $0.05 \times 100 = 5$

\therefore No, the monopoly and the competitive market sell the same level output at 5 units.

3 Problem 8, Chapter 13 in Church and Ware (2000) (Church and Ware (2000) is an e-book and is available online).

8. Output is homogenous and the demand curve is

$$P = 448 - Q.$$

There are two firms with identical costs given by $C = q_i^2$ where q_i is the production of firm i . The marginal cost of firm i is $MC_i(q_i) = 2q_i$.

- Find the Cournot equilibrium firm outputs.
- Find the Stackelberg equilibrium firm outputs.

$$\textcircled{a} TR_1 = [448 - (q_1 + q_2)] \cdot q_1$$

$$TR_1 = 448q_1 - q_1^2 - q_1q_2$$

$$MR_1 = \frac{\partial TR_1}{\partial q_1} = 448 - 2q_1 - q_2$$

$$MR = MC: 448 - 2q_1 - q_2 = 2q_1$$

$$448 - 4q_1 - q_2 = 0$$

$$TR_2 = [448 - (q_1 + q_2)] \cdot q_2$$

$$TR_2 = 448q_2 - q_1q_2 - q_2^2$$

$$MR_2 = \frac{\partial TR_2}{\partial q_2} = 448 - q_1 - 2q_2$$

$$MR = MC: 448 - q_1 - 2q_2 = 2q_2$$

$$448 - q_1 - 4q_2 = 0$$

$$\left\{ \begin{array}{l} 448 - 4q_1 - q_2 = 0 \quad \rightarrow \quad -4q_1 - q_2 = -448 \quad \textcircled{1} \\ 448 - q_1 - 4q_2 = 0 \quad \rightarrow \quad -q_1 - 4q_2 = -448 \quad \textcircled{2} \end{array} \right.$$

$$q_1 = q_2 = 89.6 \text{ units}$$

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(b) from firm 2: $\pi_2 = p \times q_2 - TC_2$

$$\pi_2 = (448 - q_1 - q_2) q_2 - q_2^2$$

$$\pi_2 = 448q_2 - q_1q_2 - q_2^2 - q_2^2 = 448q_2 - q_1q_2 - 2q_2^2$$

$$\frac{\partial \pi_2}{\partial q_2} = 448 - q_1 - 4q_2$$

$$448 - q_1 = 4q_2$$

$$q_2^* = \frac{448 - q_1}{4}$$

from firm 1: $\pi_1 = p \times q_1 - TC_1$

$$\pi_1 = (448 - q_1 - q_2) q_1 - q_1^2$$

$$\pi_1 = 448q_1 - q_1^2 - q_1q_2 - q_1^2$$

$$= 448q_1 - 2q_1^2 - q_1q_2$$

$$= 448q_1 - 2q_1^2 - \left(\frac{448 - q_1}{4}\right) q_1 = 448q_1 - 2q_1^2 - \frac{448q_1 + q_1^2}{4}$$

$$= 448q_1 - 2q_1^2 - 112q_1 + \frac{1}{4}q_1^2$$

$$\frac{\partial \pi_1}{\partial q_1} = 448 - 4q_1 - 112 + \frac{1}{2}q_1 = 336 - 4q_1 + \frac{1}{2}q_1$$

$$-\frac{7}{2}q_1 = -336 \quad q_1^* = 96$$

$$q_2^* = \frac{448 - 96}{4} = 88 \quad q_2^* = 88$$

$$\therefore \begin{cases} q_1^* = 96 \\ q_2^* = 88 \end{cases}$$

4 (write about 0.5 page) Find 1 example of an industry that has a dominant firm. Describe what this industry is, which firm is the dominant firm, which firms are fringe firms (name the ones that you

The example of an industry in Thailand that has a dominant firm is the telecommunication market. The telecommunication industry consists of cable companies, internet service providers, satellite companies, and telephone companies. Thailand's telecommunication market has strong growth due to increasing population, communication service and rising adoption of smartphone service. The growth of the industry supported by regulatory authorities. AIS is the dominant firm in Thailand telecommunication industry while TRUE and DTAC are example of fringe firms. The competition in the industry is highly consolidated with only few players. Leaders such as AIS continue to be a significant market share at high competition. Entry into the telecommunication market is difficult since the government-held auctions for operating which no new entrants have appeared.