

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?

$$1. Q(p) = p^\epsilon$$

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

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

$$\frac{dQ}{dP} \cdot \frac{P}{Q} = \epsilon p^{\epsilon-1} \times p^{1-\epsilon}$$

$$= \epsilon$$

\therefore Elasticity of demand is ϵ

profit maximize condition

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

from $Q(p) = p^\epsilon$

$$MC = MR$$

$$P = Q^{\frac{1}{\epsilon}}$$

$$1 = \left(\frac{1}{\epsilon} + 1\right) Q^{\frac{1}{\epsilon}}$$

$$\frac{dQ}{dP} \cdot \frac{P}{Q} = -2 \times \frac{2}{1/4}$$

$$TR = P \cdot Q$$

$$\frac{1}{\epsilon + 1} = Q^{\frac{1}{\epsilon}}$$

$$\frac{dQ}{dP} \cdot \frac{P}{Q} = -16$$

$$= Q^{\frac{1}{\epsilon} + 1}$$

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

$$Q = 10 - P$$

$$P = 10 - Q$$

$$MR = \left(\frac{1}{\epsilon} + 1\right) Q^{\frac{1}{\epsilon}}$$

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

Maximizing price is $P = 10 - Q$

- 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?

profit maximize condition

$$MC = MR$$

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

$$MR = 10 - 2Q$$

$$10 - 2Q = 0$$

$$10 = 2Q$$

$$Q = 5$$

Output sold by each competitive firm = 0.05

Total number of firms = 100

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

No, the monopoly sells same output levels as the competitive market.

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

Cournot Model

$$\pi = P(Q)Q - C(Q)$$

$$= 488 - Q_i - Q_x)Q_i - Q_i^2$$

$$= 488Q_i - Q_i^2 - Q_xQ_i - Q_i^2$$

$$= 488Q_i - Q_xQ_i - 2Q_i^2$$

$$\therefore Q_i = 122 - \frac{1}{4}Q_x \quad - \textcircled{1}$$

$$Q_x = 122 - \frac{1}{4}Q_i \quad - \textcircled{2}$$

Sub $\textcircled{2}$ in $\textcircled{1}$ $Q_i = 122 - \frac{1}{4}(122 - \frac{1}{4}Q_i)$

$$Q_i = 122 - 28 + \frac{1}{13}Q_i$$

$$\frac{15}{16}Q_i = 84$$

$$Q_i = 89.6$$

$$Q_x = 89.6$$

$$\frac{\partial \pi}{\partial Q_i} = 488 - Q_x - 4Q_i = 0$$

$$4Q_i = 488 - Q_x$$

$$Q_i = 122 - \frac{1}{4}Q_x$$

$$Q_x = 488 - 4Q_i$$

Stackelberg Model

Firm 1 set the first move

$$\text{Firm 2 : } \pi = P(Q_1, Q_2)Q_2 - Q_2^2$$

$$= (498 - Q_1 - Q_2)Q_2 - Q_2^2$$

$$= 498Q_2 - Q_2^2 - Q_1Q_2 - Q_2^2$$

$$= 498Q_2 - 2Q_2^2 - Q_1Q_2$$

$$\frac{\partial \pi}{\partial Q_2} = 498 - 4Q_2 - Q_1 = 0$$

$$Q_2 = 122 - \frac{1}{4}Q_1$$

Firm 1

$$\pi = (Q_1, Q_2)Q_1 - Q_1^2$$

$$= (336 - \frac{1}{4}Q_1)Q_1 - Q_1^2$$

$$= 336Q_1 - \frac{1}{4}Q_1^2 - Q_1^2$$

$$= 336Q_1 - \frac{5}{4}Q_1^2$$

$$\frac{\partial \pi}{\partial Q_1} = 336 - \frac{5}{2}Q_1 = 0$$

$$Q_1 = 96$$

$$Q_2 = 88$$

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

Nike is dominant firm in athletic footwear. Nike is the leading global brand dealing in athletic wear and sports apparel from America. For the last year Nike total revenue amount to 37 billion USD. Meanwhile fringe firm for example Puma last year total revenue is only 3.7 billion USD or Asics last year total revenue is 2.9 billion USD. One of important things that make Nike is most popular shoes is some shoes designed in 1970 and 1980 still selling equally well or in many cases better than shoes featuring state of the art technology. Including collaboration with artist for example collaboration with G-Dragon, Korean artist, they repurpose Nike Air Force 1 that release in 1982 to the new color and add some G-Dragon signature on the shoes and its sold out in 5 minutes. Other example of Nike industry is in NBA, the basketball league that has a lot of influenced to America people, for last year top 10 shoes that NBA players choose to wear top 9 are from Nike that mean Nike can control most of the basketball shoes market.