

1)

Profit max.

$$Q_p = p^e$$

$$\frac{dQ}{dp} = e p^{e-1}$$

$$\frac{dQ}{dp} \cdot p = e p^{e-1} \cdot p = e p^e$$

$$= e p^{e-1} \cdot p^{1-e}$$

$$= e$$

$$TR = Q^{1/e} + 1$$

$$MR = \left(\frac{1}{e} + 1\right) Q^{1/e - 1}$$

$$e = -2$$

$$MR = MC$$

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

$$Q^{1/e} = \frac{1}{1/e + 1}$$

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

$$Q = 1/4$$

$$\frac{dQ}{dp} \cdot p = e \frac{Q^{1/e}}{Q} = -2 \cdot \frac{2}{1/4} = -16$$

2)

Profit max.

$$Q = 10 - p$$

$$P = 10 - Q$$

$$MR = MC$$

$$10 - 2Q = 0$$

$$Q = 5$$

Output sold by each competitive firm : 0.05 Total output sold by competitive firm : (0.05 x 100) = 5
 Number of firm : 100 No, the monopoly sells the same quantity in the competitive market

3a)

Cournot

$$\pi = PQ - C$$

$$P = 448 - Q$$

$$Q = 448 - P$$

$$\pi = (448 - Q_i - Q_{ii}) Q_i - Q_i^2$$

$$= 448 Q_i - Q_i^2 - Q_{ii} Q_i - Q_i^2$$

$$= 448 Q_i - Q_{ii} Q_i - 2 Q_i^2$$

$$\frac{d\pi}{dQ_i} = 448 - Q_{ii} - 4 Q_i = 0$$

$$4 Q_i = 448 - Q_{ii}$$

$$Q_i = 112 - 1/4 Q_{ii} \quad Q_{ii} = 448 - 4 Q_i$$

$$Q_i = 112 - 1/2 (448 - 4 Q_i)$$

$$= 96.5$$

$$Q_{ii} = 96.5$$

3b)

Stackleberg

Firm 1 : leader Firm 2 : follower

$$Q_1 = 112 - 0.25 Q_2$$

$$P = 448 - (112 - 0.25 Q_2) - Q_2$$

$$P = 448 - 112 + 0.25 Q_2 - Q_2$$

$$= 336 - 0.75 Q_2$$

$$TR_2 = P \cdot Q_2$$

$$TR_2 = (336 - 0.75 Q_2) Q_2$$

$$= 336 Q_2 - 0.75 Q_2^2$$

$$MR_2 = 336 - 1.5 Q_2$$

Profit max.

$$MR = MC$$

$$336 - 1.5 Q_2 = 0$$

$$336 = 1.5 Q_2$$

$$Q_2 = 96 \text{ units}$$

$$Q_1 = 112 - 0.25(96)$$

$$= 88 \text{ units}$$

$$Q_2 = 96 \text{ units}$$

4)

According to what I have studied in EE311 (Microeconomics Theory), petroleum industry is one example of industries that contain a dominant and fringe firm. Petroleum industry or oil industry is about exploring, extracting, transportation, and selling petroleum products such as gasoline for cars. In Thailand, PTT acts as a dominant firm that controls and sets oil price before any other fringe firms. These fringe firms are Shell, Caltex, Esso, and Bang Chak for example.