Chapter 16 Practice Problems

Elements of Microeconomics (discussion section 4)

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Question 1

Consider a monopolistically competitive market with N firms in it. The following demand, marginal revenue, total cost, and marginal cost equations are for a single firm in the market:

$$Q_D = 50/N - 2P$$

$$MR = 100/N - Q$$

$$TC = 30 + Q^2$$

$$MC = 2Q$$

(a) How does the number of firms in the market (N) affect the demand curve of each firm?

(b) At what Q will each firm produce?

(c) What price does each firm charge?

(d) How much profit does each firm make?

(e) In the long run (where entry and exit are possible), how many firms will there be in this market?

Answer:

(a) As more firms enter the market ($N \uparrow$), the demand curve will shift left (decrease). Mathematically this is because the intercept of the demand curve (which is $P = \frac{25}{N} - \frac{1}{2}Q_D$) decreases as N increases. Intuitively this is because when more firms are in the market, there are more substitutes for consumers to choose between, so the market share of each firm will decrease.

(b) Each firm will produce the Q where their $MR = MC$:

$$\begin{aligned} MR &= MC \\ \frac{100}{N} - Q &= 2Q \\ \frac{100}{N} &= 3Q \\ \frac{100}{3N} &= Q \end{aligned}$$

So the Q produced by each firm will depend on how many firms are in the market.

(c) Each firm will charge the P corresponding to $Q = \frac{100}{3N}$ on the demand curve

$$\begin{aligned} Q_D &= \frac{50}{N} - 2P \\ \frac{100}{3N} &= \frac{50}{N} - 2P \\ 2P &= \frac{150 - 100}{3N} \\ P &= \frac{25}{3N} \end{aligned}$$

Which, again, depends on the number of firms in the market.

(d) Each firm will earn 0 economic profit in this long run equilibrium. This is true for any firm in a monopolistically competitive market. If any firm was making a profit, more firms would enter, shifting the demand curve to the left, causing a decrease in profit until it is 0.

(e) We know that in the long-run, in order for firms to be making zero economic profit, the ATC curve must be tangent to the demand curve. Equivalently, is when each firm is making zero economic profit. We knwo that $\pi = (P - ATC) \times Q$. We can calculaste ATC from TC:

$$\begin{aligned} ATC &= TC/Q \\ &= \frac{30}{Q} + Q \end{aligned}$$

The we can set profit equal to 0, plug in ATC, P, and Q (we have already solved for each of them):

$$\begin{aligned} \pi &= (P - ATC) \times Q \\ 0 &= (P - ATC) \times Q \\ 0 &= (\frac{25}{3N} - (\frac{30}{100/3N} - \frac{100}{3N})) \times \frac{100}{3N} \\ 0 &= (\frac{25}{3N} - (\frac{270N^2}{300N} - \frac{1000}{300N})) \times \frac{100}{3N} \\ 0 &= (\frac{25}{3N} - \frac{270N^2 - 1000}{300N}) \times \frac{100}{3N} \\ 0 &= \frac{1250 - 270N^2}{300N} \times \frac{100}{3N} \\ \frac{270N}{300} \times \frac{100}{3N} &= \frac{1250}{300N} \times \frac{100}{3N} \\ 3 &= \frac{1250}{9N^2} \\ N^2 &= \frac{1250}{27} \\ N &= \sqrt{(\frac{1250}{27})} \end{aligned}$$

Question 2

Consider the market for grocery stores. Giant is one of the many firms in this market, which is in long-run equilibrium.

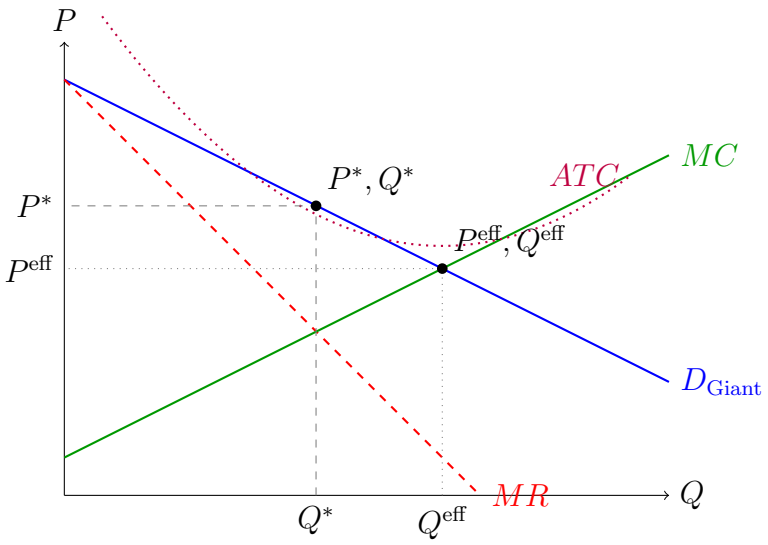
(a) Draw a diagram showing Giant's demand curve, marginal revenue, marginal cost, and average total cost. Label the profit maximizing Q and P for Giant.

(b) What is the efficient/socially optimal level of output and price in this market? Label this on your diagram.

(c) What is Giant's profit? Why?

Answer:

(a) Graph:



(b) The efficient/socially optimal Q and P are on the graph above. Notice $P^{eff} < P^*$ and $Q^{eff} > Q^*$.

(c) Giant will earn zero economic profit, just like any firm in a monopolistically competitive market. If any firm was earning positive profit, other firms would enter the market and drive profit to 0.

Question 3

How would you classify each of the following markets, perfect competition, monopolistic competition, or monopoly? Explain why.

(a) Tap water

(b) Lipstick

(c) Local electricity

(d) Peanut butter

(e) Train tickets

Answer:

(a) Tap water: Perfect competition; there are many suppliers and buyers of tap water and all water is perfectly homogeneous

(b) Lipstick: monopolistic competition; there are many buyers and sellers of lipstick, but the products are differentiated by brands

(c) Local electricity: monopoly; there is only on seller and electricity has no close substitutes

(d) Peanut butter: monopolistic competition; there are many buyers and sellers of peanut butter but the jars are differentiated by the producer

(e) Train tickets: monopoly; for the most part, there is only one option of who to purchase train tickets from depending on where you want to go, and there are no close (rail) substitutes.