AEM 4160: Strategic Pricing

ANSWER KEY FOR PART I

Question 1. After spending 10 years and $1.5 billion, you finally have gotten Food and Drug Administration approval to sell your new patented wonder drug which reduces the ache and pain associated with aging joints. You will market his drug under the brand name Ageless. Market research indicates that the elasticity of demand of Ageless is 1.25 (at all points on the demand curve). You estimate the marginal cost of manufacturing and selling one dose of Ageless at $1.

a) What is the profit-maximizing price per dose of Ageless?

b) Would you expect the elasticity of demand you face for Ageless to rise or fall when your patent expires?

ANSWER:
(a) The profit-maximizing price, P should be such that
$(P-MC)/P=1/|E_d|$

where $|E_d|$ is the absolute value of price elasticity of demand. We know that the marginal cost is 1 and $|E_d|=1.25$, therefore:

$(P-1)/P=1/1.25$
$P=\$5$

Notice that the $1.5 billion become sunk costs so they do not affect the pricing decision.

(b) When the patent expires, other firms would be able to produce perfect substitutes to Ageless. In other words, your product will have competition, so the demand for Ageless will be more sensitive (i.e., more elastic) than in the good old days when the patent made you a monopolist. This would force you to lower the price of Ageless.

Question 2. Assume that a monopolist sells a product with a total cost function $TC=400+Q^2$. The market demand curve is given by the equation $P=500-Q$.

a) Find the profit-maximizing output and price for this monopolist. Is the monopolist profitable?

b) Calculate the price elasticity of demand at the monopolist's profit-maximizing price. Also calculate the marginal cost at the monopolist's profit-maximizing output.

c) Calculate the Lerner Index of Market power. Verify that Inverse Elasticity Pricing Rule holds at your calculated equilibrium price and quantity.

ANSWER

a) To find the profit-maximizing price and quantity, set $MR = MC$.

$$MR = 500 - 2Q$$

$$MC = 2Q$$

$$2Q = 500 - 2Q$$

$$4Q = 500$$

$$Q = 125$$

Plug Q into the demand curve to find P.

$$P = 500 - Q$$

$$P = 500 - 125$$

$$P = 375$$

Profit equals total revenue minus total cost.

$$\pi = PQ - TC$$

$$\pi = 125(375) - (400 + 125^2)$$

$$\pi = 46,875 - 400 - 15,625$$

$$\pi = 30,852$$

Yes, the monopolist is profitable.

b) The price elasticity of demand at the profit-maximizing price is -3.

$$\varepsilon_{Q,P} = \frac{\Delta Q}{\Delta P}\frac{P}{Q}$$

$$\varepsilon_{Q,P} = -1\left(\frac{375}{125}\right) = -3$$

The marginal cost when $Q = 125$ equals $2Q = 2(125) = 250$.

c) the rule holds. Lerner Index = 1/3

$$IEPR \Rightarrow \frac{P - MC}{P} = -\frac{1}{\varepsilon_{Q,P}}$$

$$\frac{375 - 250}{375} = -\frac{1}{-3}$$

$$\frac{1}{3} = \frac{1}{3}$$