



B.E. International Program
Faculty of Economics
Thammasat University



EE311 Microeconomics Theory, Semester 2/2019
Homework Assignment #5 | Due date: Friday 27 March 2020

Instruction:

- 1) Attempt all questions.
- 2) You may study and discuss in group but you have to write up your solutions independently and by handwriting only. Copying and/or Plagiarism is considered as a serious crime in academic arena and it will not be tolerated. If detected, all parties involved receive 'zero.'
- 3) If you have any questions, please feel free to email me at pongpalin@econ.tu.ac.th

Monopoly (CH 11)

1. Algebraically show that the marginal revenue for a monopolist is less than the market price for positive quantities of output. Also, explain WHY.

10. Suppose that Intel has a monopoly in the market for microprocessors in Brazil. During the year 2005, it faces a market demand curve given by $P = 9 - Q$, where Q is millions of microprocessors sold per year. Suppose you know nothing about Intel's costs of production. Assuming that Intel acts as a profit-maximizing monopolist, would it ever sell 7 million microprocessors in Brazil in 2005?

(**Hint:** Find MR at $Q = 7$, and then interpret its value in order to

1.) Marginal revenue is less than price for Monopolist because the firm's revenue increase from the additional units it sells, and the firm's revenue decreases because it loses revenue from selling units at a lower price than it have had it chosen a lower quantity of output.

$$\text{The change in revenue is } MR = \frac{\Delta TR}{\Delta Q} = P + Q \frac{\Delta P}{\Delta Q}$$

10.) if demand is $P = 9 - Q$, then $MR = 9 - 2Q$. If the firm sets $Q = 7$, then $MR = -5$. At this point, if the firm lowered its output it would increase total revenue, and with the lower level of output total cost would fall. So, decreasing output would increase profit.

answer the question.)

14. Suppose a monopolist has a constant marginal cost $MC = £50$ and faces a demand curve $P = 100 - Q/2$ (which can be rewritten as $Q = 200 - 2P$).

(a) Find the profit-maximizing price and quantity using the monopoly midpoint rule.

(b) Find the profit-maximizing price and quantity by equating MR to MC.

16. A monopolist serves a market in which the demand is $P = 120 - 2Q$. It has a fixed cost of 300. Its marginal cost is 10 for the first 15 units ($MC = 10$ when $0 < Q < 15$). If it wants to produce more than 15 units, it must pay overtime wages to its workers, and its marginal cost is then 20. What is the maximum amount of profit the firm can earn?

(Hint: When $MR = MC = 10$, is it true that $0 < Q < 15$?)

18. Suppose a monopolist has an inverse demand function given by $P = 100Q^{(-1/2)}$. What is the monopolist's optimal mark-up of price above marginal cost?

(Hint: Find $(P - MC)/P$.)

Interpretation of IEPR

For example, if $(P - MC)/P = 1/4 = 25\%$, this means that the optimal PERCENTAGE mark-up of price over marginal cost is $1/4$ or 25%.

19. The marginal cost of preparing a large latte in a specialty coffee house is \$1. The firm's market research reveals that the elasticity of demand for its large lattes is constant, with a value of about -1.3 . If the firm wants to maximize profit from the sale of large lattes, about what price should the firm charge?

20. Imagine that Gillette has a monopoly in the market for razor

blades in Mexico. The market demand curve for blades in Mexico is $P = 968 - 20Q$, where P is the price of blades in cents and Q is annual demand for blades expressed in millions. Gillette has two plants in which it can produce blades for the Mexican market: one in Los Angeles and one in Mexico City. In its L.A. plant, Gillette can produce any quantity of blades it wants at a marginal cost of 8 cents per blade. Letting Q_1 and MC_1 denote the output and marginal cost at the L.A. plant, we have $MC_1(Q_1) = 8$. The Mexican plant has a marginal cost function given by $MC_2(Q_2) = 1 + 0.5Q_2$.

(a) Find Gillette's profit-maximizing price and quantity of output for the Mexican market overall. How will Gillette allocate production between its Mexican plant and its U.S. plant?

(Hint: Find TOTAL MC of the multi-plant monopolist and then set $MC_{\text{Total}} = MR$)

14.) a.) a vertical intercept of 100 for demand from the expression of inverse demand, $P = 100 - Q/2$ and intercept of 50 for marginal cost, as it is constant at 50. So, we have price equal to midpoint between 50 and 100. $\rightarrow 75 = 100 - Q/2$ or $Q = 50$.

b.) $MR = 100 - Q$. As marginal cost, we got $Q = 50$.
substituting $\rightarrow P = 100 - 50/2 = 75$.

16.) $MR = 120 - 4Q$. Then, we have two region of output
Region I: where $MC = 10$ and $0 \leq Q \leq 15$

Region II: $MC = 20$ and $15 < Q$

Assume that $MC = 10$, optimal quantity is in Region I is not correct.

So, let's assume that $MC = 20$ and optimal quantity is greater than 15 units. $MR = MC$, we find that

$120 - 4Q = 20$, or that $Q = 25$. when $Q = 25$, MC is 20.

\therefore the market price is $P = 120 - 2(25) = 70$

Revenue = $PQ = 70(25) = 1750$

Variable cost = $10(15) + 20(25 - 15) = 350$

Fixed cost = 300

Profit = $1750 - 350 - 300 = 1100$

18.) the regular form $Q = f(P)$. Reverse $\rightarrow Q = 10,000 P^{-2}$
so the demand elasticity is -2. Using the IEPR,
 $\frac{P-MC}{P} = \frac{1}{2}$. The optimal percentage = 50%

19.) Since the elasticity of demand is constant, we can use inverse elasticity rule.

$$\rightarrow \frac{P-MC}{P} = \frac{-1}{e_d} \rightarrow \frac{P-1}{P} = \frac{-1}{1.3}$$

\therefore we expect to see firm change about 4.33

20.) a) $MC_2 < MC_1$, whenever $1 + 0.5Q_2 < 8$ or $Q_2 < 14$.

So, small level of output, specifically $Q < 14$,

Gillette will only use the first plant. For $Q > 14$ it will be set $Q_2 = 14$ and $Q_1 = Q - 14$. Then $MC = 8$

with $MR = 968 - 40Q \rightarrow Q = 24$. So, $Q > 14$ is valid.

the allocation between plants will be $Q_2 = 14$ $Q_1 = 10$

with the total quantity $Q = 24$ the firm will charge

a price of $P = 968 - 20(24) = 488$. the price = 4.88