

Please write your answers neatly and legibly.

1. Consider a market that is comprised of two types of buyers whose demand curves are given by the following equations where P is the price per unit in dollars and Q is the number of units of the good:

Demand for Type I buyers: $P = 20 - (1/2)Q$

Demand for Type II buyers: $P = 10 - (1/8)Q$

Suppose there is a single producer of this good and the producer's MC is given by the equation:

$MC = 2$

Assume that this producer has no fixed costs.

- a. (2.5 points) Suppose that this producer can treat this market as two separate markets: the market for Type I buyers and the market for Type II buyers. Given the above information, calculate the profit maximizing price for Type I buyers, the profit maximizing quantity for Type I buyers, the level of total revenue from Type I buyers, the level of total cost incurred in producing for Type I buyers, and the level of profits from this group of buyers. Show all your work for full credit. Put your answers in the provided spaces.

Price to Type I buyers = _____

Quantity to Type I buyers = _____

Total Revenue from Type I buyers = _____

Total Cost from Type I buyers = _____

Profit from Type I buyers = _____

Answer:

To find the profit maximizing you need to equate the firm's MR to its MC: $MR = 20 - Q$. So,

$MR = MC$

$20 - Q = 2$

$Q = 18$ units

To find the price, plug this quantity into the demand equation:

$P = 20 - (1/2)(18) = 20 - 9 = \11 per unit

$TR = P \cdot Q = (\$11 \text{ per unit})(18 \text{ units}) = \198

$TC = ATC \cdot Q = MC \cdot Q$ since the firm has constant AVC and $AFC = 0$. So,

$TC = (\$2 \text{ per unit})(18 \text{ units}) = \36

Profits from Type I buyers = $TR - TC = 198 - 36 = \$162$

Price to Type I buyers = ____\$11 per unit____

Quantity to Type I buyers = ____18 units____

Total Revenue from Type I buyers = ____\$198____

Total Cost from Type I buyers = ____\$36____

Profit from Type I buyers = ____\$162____

- b. (2.5 points) Suppose that this producer can treat this market as two separate markets: the market for Type I buyers and the market for Type II buyers. Given the above information, calculate the profit maximizing price for Type II buyers, the profit maximizing quantity for Type II buyers, the level of total revenue from Type II buyers, the level of total cost incurred in producing for Type II buyers, and

the level of profits from this group of buyers. Show all your work for full credit. Put your answers in the provided spaces.

Price to Type II buyers = _____
Quantity to Type II buyers = _____
Total Revenue from Type II buyers = _____
Total Cost from Type II buyers = _____
Profit from Type II buyers = _____

Answer:

To find the profit maximizing you need to equate the firm's MR to its MC: $MR = 10 - (1/4)Q$. So,
 $MR = MC$

$$10 - (1/4)Q = 2$$

$$(1/4)Q = 8$$

$$Q = 32 \text{ units}$$

To find the price, plug this quantity into the demand equation:

$$P = 10 - (1/8)(32) = 10 - 4 = \$6 \text{ per unit}$$

$$TR = P \cdot Q = (\$6 \text{ per unit})(32 \text{ units}) = \$192$$

$TC = ATC \cdot Q = MC \cdot Q$ since the firm has constant AVC and $AFC = 0$. So,

$$TC = (\$2 \text{ per unit})(32 \text{ units}) = \$64$$

$$\text{Profits from Type I buyers} = TR - TC = 192 - 64 = \$128$$

Price to Type I buyers = ____\$6 per unit_____
Quantity to Type I buyers = ____32 units_____
Total Revenue from Type I buyers = ____\$192_____
Total Cost from Type I buyers = ____\$64_____
Profit from Type I buyers = ____\$128_____

c. (5 points) Suppose that this producer is forced to sell this good to both Type I and Type II buyers as if they are a single market (the producer would be a single price monopolist in this case). Calculate the profit maximizing quantity if the producer combines these two types of buyers into one market. Then, calculate the profit maximizing price for this market, the total revenue for this single price monopolist, the total cost for this single price monopolist, and the profits for this single price monopolist. Show your work for full credit. Put your answers in the provided spaces.

Price if single price monopolist = _____
Quantity if single price monopolist = _____
Total Revenue if single price monopolist = _____
Total Cost if single price monopolist = _____
Profit if single price monopolist = _____

Answer:

To answer this question you will need to find the market demand curve: this will be a kinked market demand curve. The top segment of the demand curve for quantities that are less than or equal to 20 units is $P = 20 - (1/2)Q$. The bottom segment of the demand curve for quantities that are greater than or equal to 20 and less than or equal to 120 is $P = 12 - (1/10)Q$. To find this bottom segment, you know that the point $(Q, P) = (20, 10)$ sits on this demand segment as well as the point $(Q, P) = (120, 0)$. Use these two points to write the demand equation:

$$Y = mX + b$$

$$m = (-1/10)$$

$$P = b - (1/10)Q$$

$$10 = b - (1/10)(20)$$

$$b = 12$$

$$P = 12 - (1/10)Q$$

Set $MR = MC$: (there are two MR curves, so the question is which to use....so, you could compare the profitability of the two outcomes-but, I am going to "cut to the chase" and use the lower segment since this is the part of the demand curve that will yield the greatest profit if this firm acts as a single price monopolist. Thus,

$$MC = MR$$

$$2 = 12 - (2/10)Q$$

$$(1/5)Q = 10$$

$Q = 50$ units (Note that this is the sum of the two quantities we found in (a) and (b))

$$P = 12 - (1/10)(50) = 12 - 5 = \$7 \text{ per unit}$$

$$TR = (\$7 \text{ per unit})(50 \text{ units}) = \$350$$

$$TC = (\$2 \text{ per unit})(50 \text{ units}) = \$100$$

$$\text{Profit for the single price monopolist} = \$250$$

Note that this monopolist makes greater profits if they can treat the two buyers as separate monopolies: \$290 versus \$250.

$$\text{Price if single price monopolist} = \underline{\hspace{1cm}} \$7 \text{ per unit} \underline{\hspace{1cm}}$$

$$\text{Quantity if single price monopolist} = \underline{\hspace{1cm}} 50 \text{ units} \underline{\hspace{1cm}}$$

$$\text{Total Revenue if single price monopolist} = \underline{\hspace{1cm}} \$350 \underline{\hspace{1cm}}$$

$$\text{Total Cost if single price monopolist} = \underline{\hspace{1cm}} \$100 \underline{\hspace{1cm}}$$

$$\text{Profit if single price monopolist} = \underline{\hspace{1cm}} \$250 \underline{\hspace{1cm}}$$