EXERCISE 20

TO SELL ON ONE OR ON SEVERAL MARKETS

Should a producer concentrates on one market or should he try to sell on several markets ? This exercise shows how the marginal approach helps to solve this problem.

The Electric Felicity Company, the only electricity producer in the city, could sell its output on two markets (A and B), there is no close substitute for electricity and no new competitor will be allowed to enter these markets. The two markets could be identified, but the producer is not in a position to segregate the two demands : as a consequence the price charged is the same on every markets.

Demands are given by the following functions : $P_A = 80 - 0.5\ Q_A$ and $P_B = 140 - 2\ Q_B$

Question 1.

What is the aggregate demand function for *Electric Felicity Co.* product ?

What is the marginal revenue function ?

Question 2.

Assume that the marginal cost is constant and equal to 60, what should be the quantity sold on each of the two market ?

Question 3.

Same question with a marginal cost of 40.

Question 4.

Find the marginal cost for which it is immaterial to sell on only one market or to sell on both markets, always assuming profit-maximisation.

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ANSWERS

Question 1.

To determine the combined average revenue AR_T we notice that if the selling price is higher than 80 (but lower than 140) market B is the only market on which the product can be sold. It's only when *Electric Felicity Co.* charges a price lower than 80 that he starts selling on market A.

Therefore the horizontal summation of the two demand curves yields a kinked combined demand curve with a kink for P = 80 and Q = 30.

- If $P < 80$ or $Q > 30$, we sum horizontally the two demands :

$$\begin{array}{c} Q_A = 160 - 2P_A \\ Q_B = 70 - 1/2P_B \\ \hline Q_T = Q_A + Q_B = 230 - 2P_A - 1/2\,P_B \end{array}$$

Since $P_A = P_B = P_T$: $Q_T = 230 – 5/2\ P_T$ or $AR_T = P_T = 92 – 2/5\ Q_T$

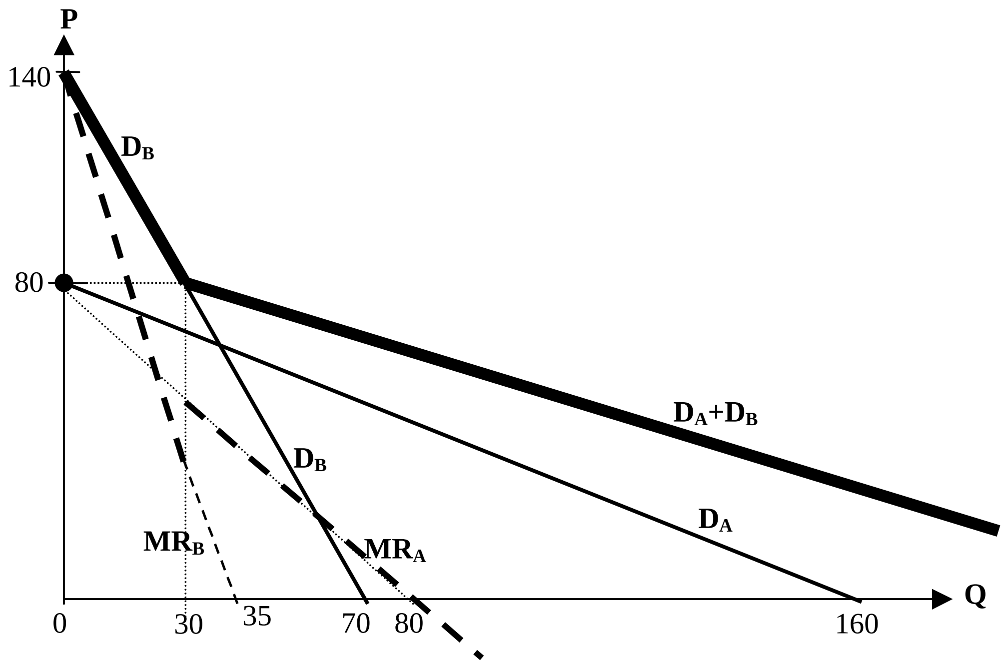
- If $80 < P < 140$ or $Q < 30$, *Electric Felicity Co.* can sell its product on market B only, and the average revenue is given by the market B demand equation :
  $AR_T = P_T = 140 - 2\ Q_T$.

The combined average revenue curve being kinked, the marginal revenue curve is divided in two segments with a discontinuity for Q = 30.

For $Q \leq 30$, the average revenue curve is linear, therefore, on the same interval, the marginal revenue curve is also linear with a slope twice steeper than the AR one : $MR_T = 140 - 4\ Q_T$.

For the same reason, $MR_T = 92 - 4/5\ Q_T$ for $Q > 30$.

Figure 1.



Question 2.

To determine the most profitable level of output, let's apply the MR = MC profit-maximizing rule.

As figure 2 shows, if marginal cost is constant and equal to 60, we have, a priori, two solutions ; the marginal cost curve intersects both segments of the marginal revenue curve at point E and point F.

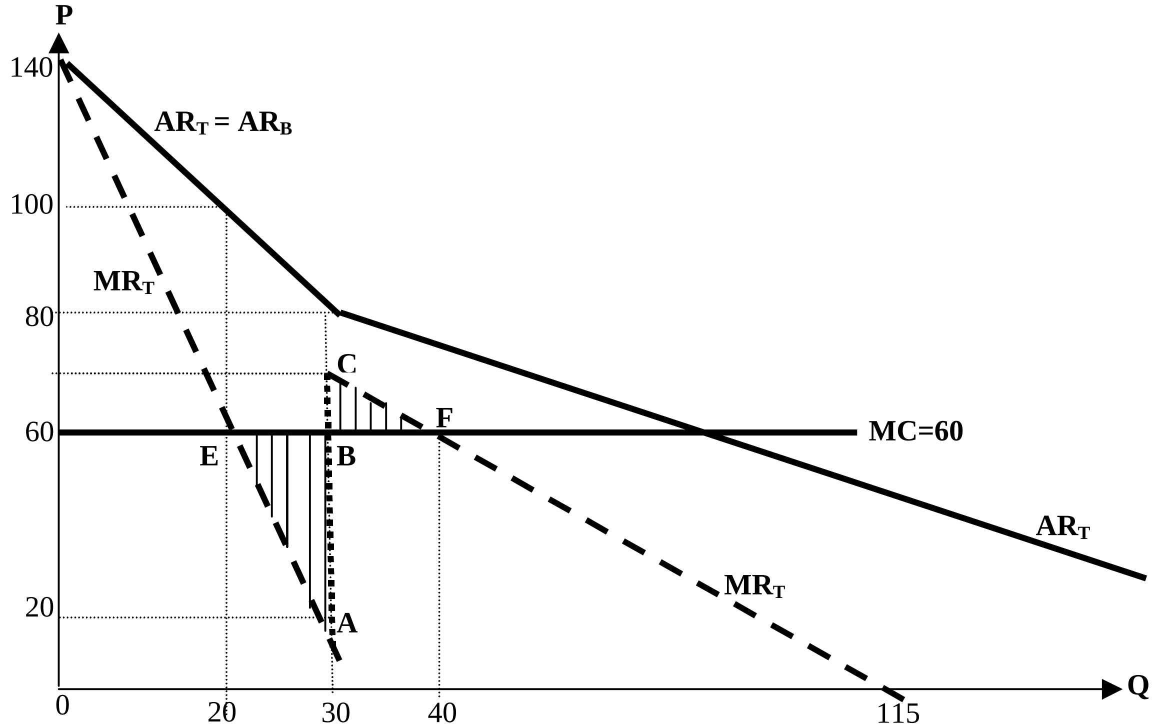
The respective numbers of units sold are determined in equalling the marginal cost to each equation of the marginal revenue in turns :

> if $Q \leq 30$ we have, $-4\,Q + 140 = 60$ and $Q = 20$, and *Electric Felicity Co.* sells in market B only ;
>
> if $Q \geq 30$ we have, $-4/5\,Q + 92 = 60$ and $Q = 40$, here, *Electric Felicity Co.* sells on both markets.

To choose between the two solutions we just have to compare the sizes of area EBA and CFB.

Area EBA is the additional total loss and area CBF is the additional total profit, associated with shifting from the solution Q = 20 to the solution Q = 40. The figure 2 shows EBA larger than BCF, therefore the most profitable solution is supplying market B only, *Electric Felicity Co.* should charge a high price of 100 and produces only 20 units.

Figure 2.
It's more profitable to supply only market B, and forget about market A
area EBA > area CBF



Question 3.

The same technique is used here for a marginal cost of 40. Figure 3 shows the two possible solutions. Comparing the sizes of HIA and ICJ, we conclude that the additional profit is larger that the additional loss and therefore the monopolist should sell in both markets at a lower price. The total number of units offered by *Electric Felicity Co.* is **65.** He charges a price of **66.**

By substitution in each market demand we obtain : Q_A = -2 (66) + 160 = **28**
and Q_B = **-** ½ (66) + 70 = **37**.

The total number of units sold is Q_t = 28 + 37 = 65.

Question 4.

From the two previous examples, one could easily imagine a case where the compared areas are strictly equals. In such case, additional total profit is equal to additional total loss when the seller moves from supplying one market to supplying both (Figure 4). For *Electric Felicity Co.* to sell in one market only at a higher price or on both markets at a lower price brings exactly the same amount of profit.

The areas of both triangles **Z** and **W** are equal for a marginal cost MC" :

$$(MC''-20)[30-(140-MC'')/4]/2 = (68-MC'')[(92-MC'')5/4-30]/2$$
$$\text{or } MC''^2 - 160\ MC'' + 5680 = 0 \text{ or for } \mathbf{MC'' \approx \underline{53.16}}$$

With a marginal cost higher than 53.16 the profit-maximising monopolist should sell only on the market able to pay the higher price and forget about the other market ; while for a marginal cost lower than 53.16, *Electric Felicity Co.* should charge a lower price and sell on both markets.

Figure 3.
It's more profitable to supply both markets A and B: area HIA < area ICJ

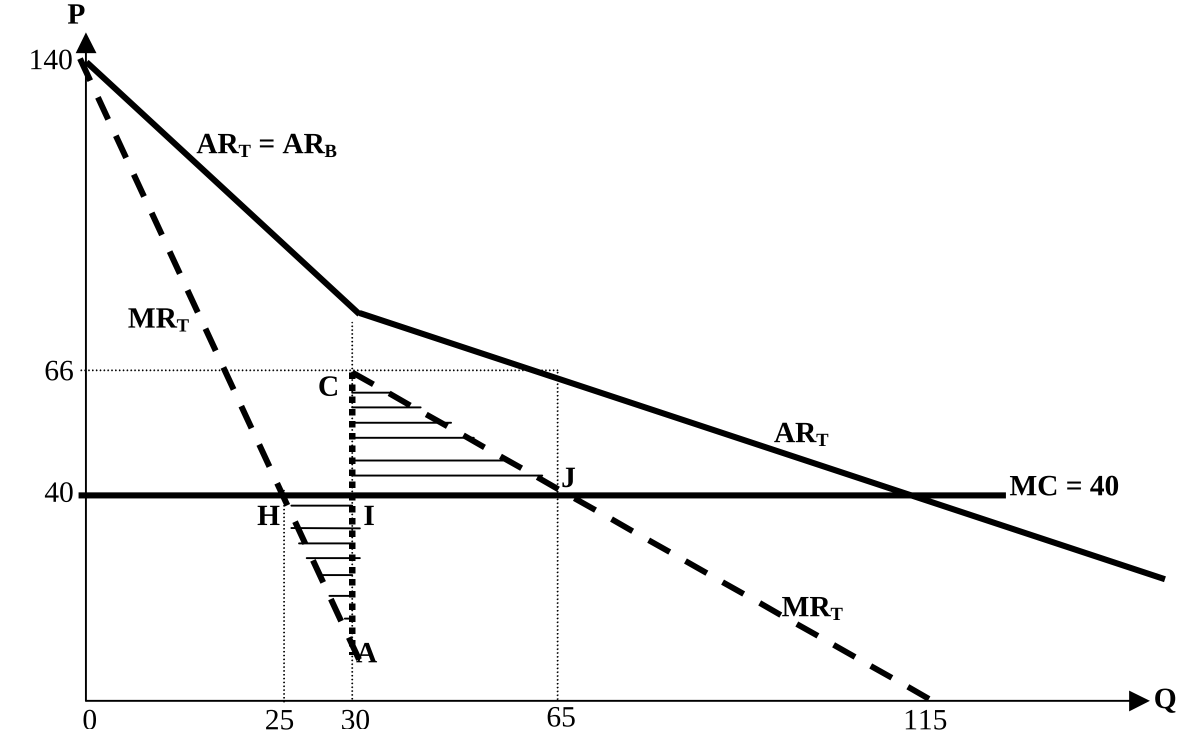
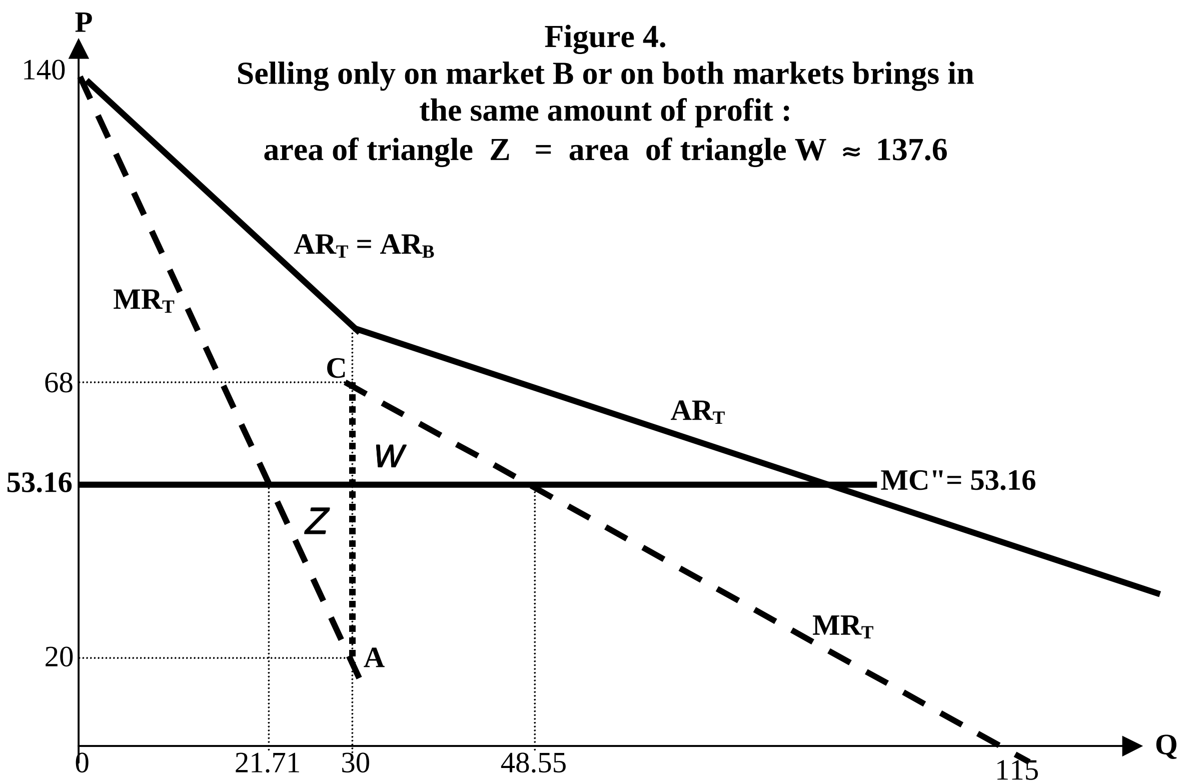


Figure 4.
Selling only on market B or on both markets brings in the same amount of profit :
area of triangle Z = area of triangle W ≈ 137.6



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