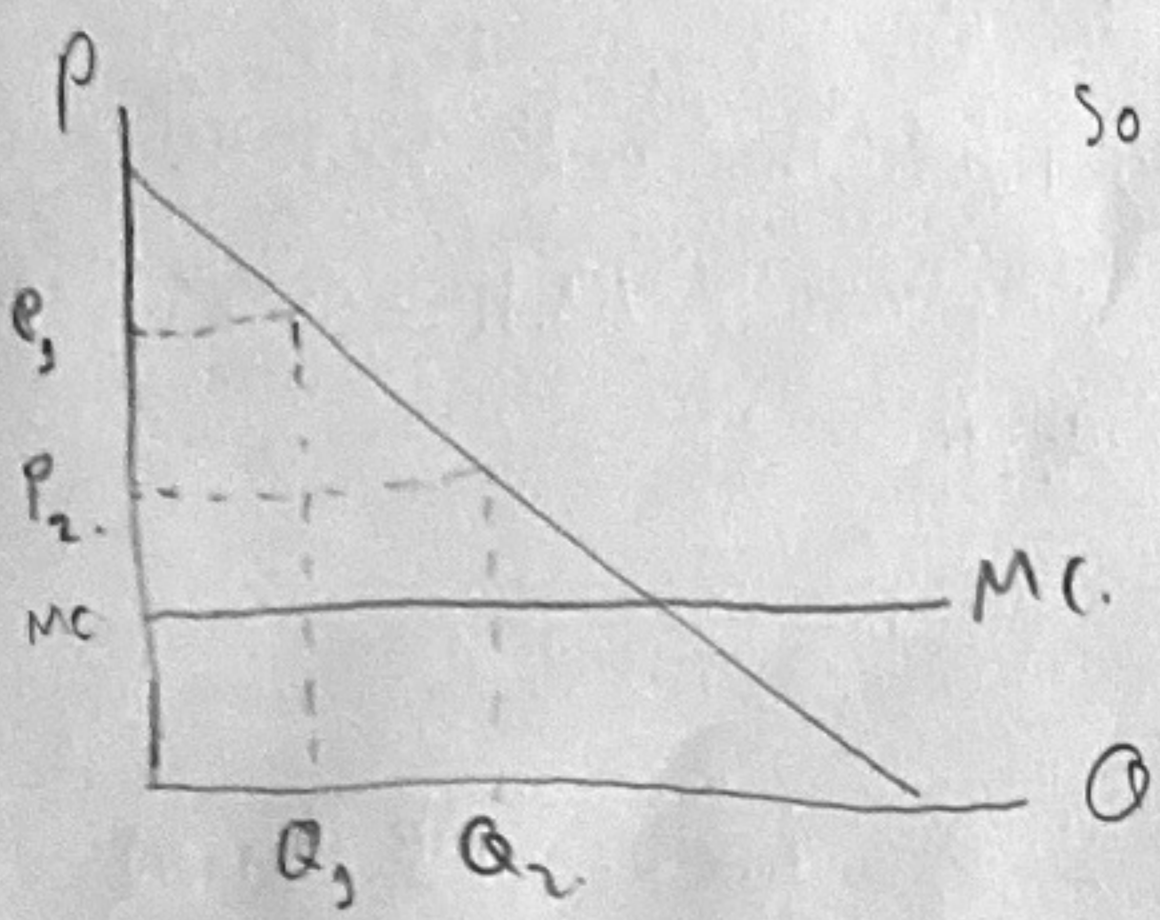
EE 311 Assignment 6 Sorravit Ma 6104640484

Example 2 Page 19 Topic 9 Part 1

Inverse Demand : $P = 100 - Q$, Marginal Cost: $MC = 10 = AC$



So producer surplus is ; $PS = P_1(Q_1) + P_2(Q_2 - Q_1) - MC(Q_2)$

$$PS = (100 - Q_1)(Q_1) + (100 - Q_2)(Q_2 - Q_1) - 10Q_2$$

$$\frac{\partial PS}{\partial Q_1} = 0 ; \quad 100 - 2Q_1 - 100 + Q_2 = 0$$

$$Q_2 = 2Q_1 \quad -①$$

$$\frac{\partial PS}{\partial Q_2} = 0 ; \quad 100 - 2Q_2 + Q_1 - 10 = 0$$

$$Q_1 - 2Q_2 = -90 \quad -②$$

$\therefore P_1 = 100 - 30 = 70$, $Q_1 = 30$ units.

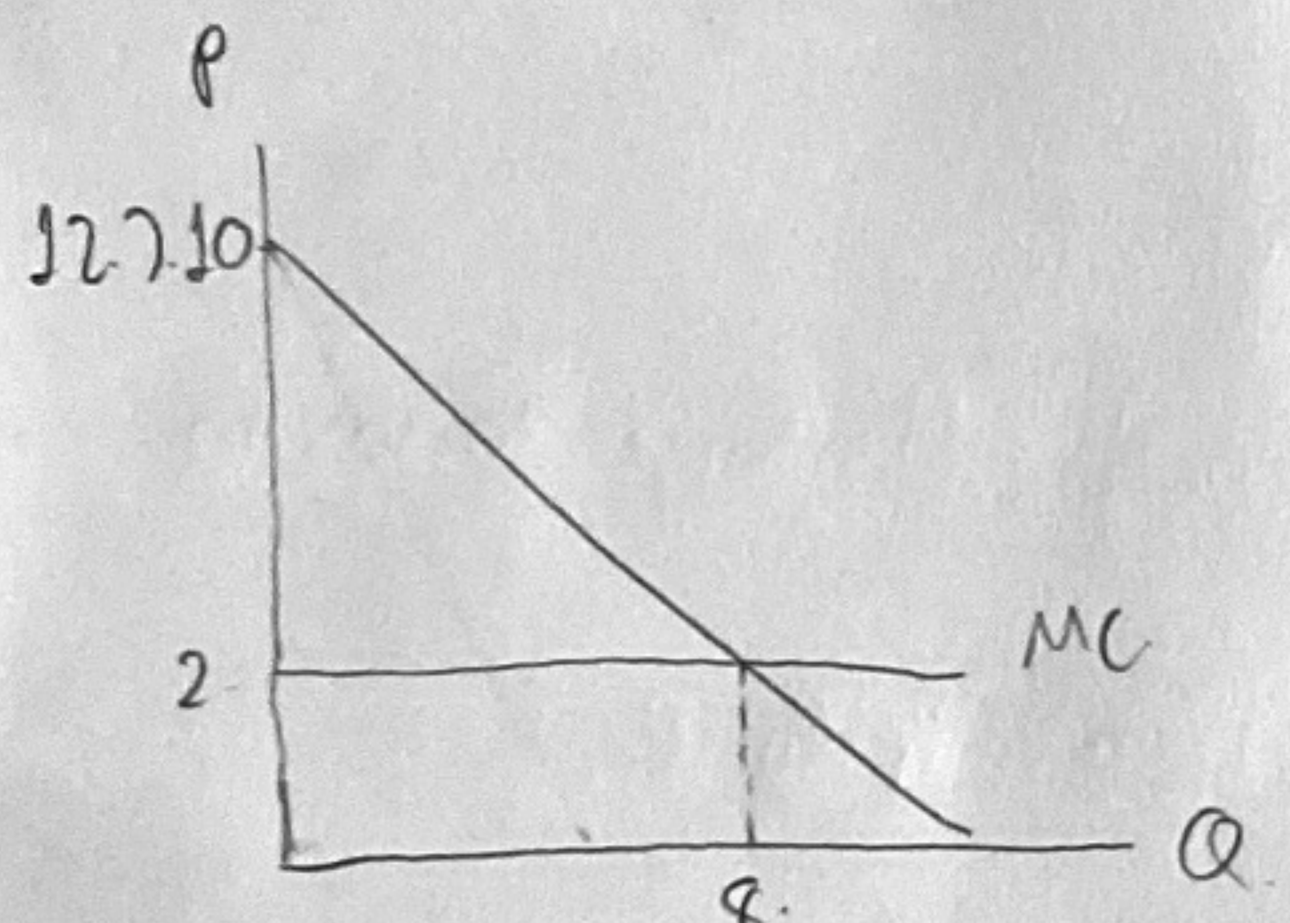
$P_2 = 100 - 60 = 40$, $Q_2 = 60$ units.

plug ① in ② ; $Q_1 - 2(2Q_1) = -90$

$$-3Q_1 = -90$$

$$Q_1 = 30$$

so $Q_2 = 60$.



$P = 10 - Q$

First, let m (usage charge) equals to 2 , as to cover the marginal cost provided.

Without s (subscription charge), the consumer surplus is $\frac{1}{2}(8)(10-2) = 32$.

In order to, maximize consumer and producer surplus and allow the firm to get zero economic profit , s (subscription charge) must cover the fixed-cost : 1,200. So the firm must collect the subscription charge (s) from individuals 12.

$\therefore$ The firm charge $s = 12$ for each individual and $m = 2$ for each usage.

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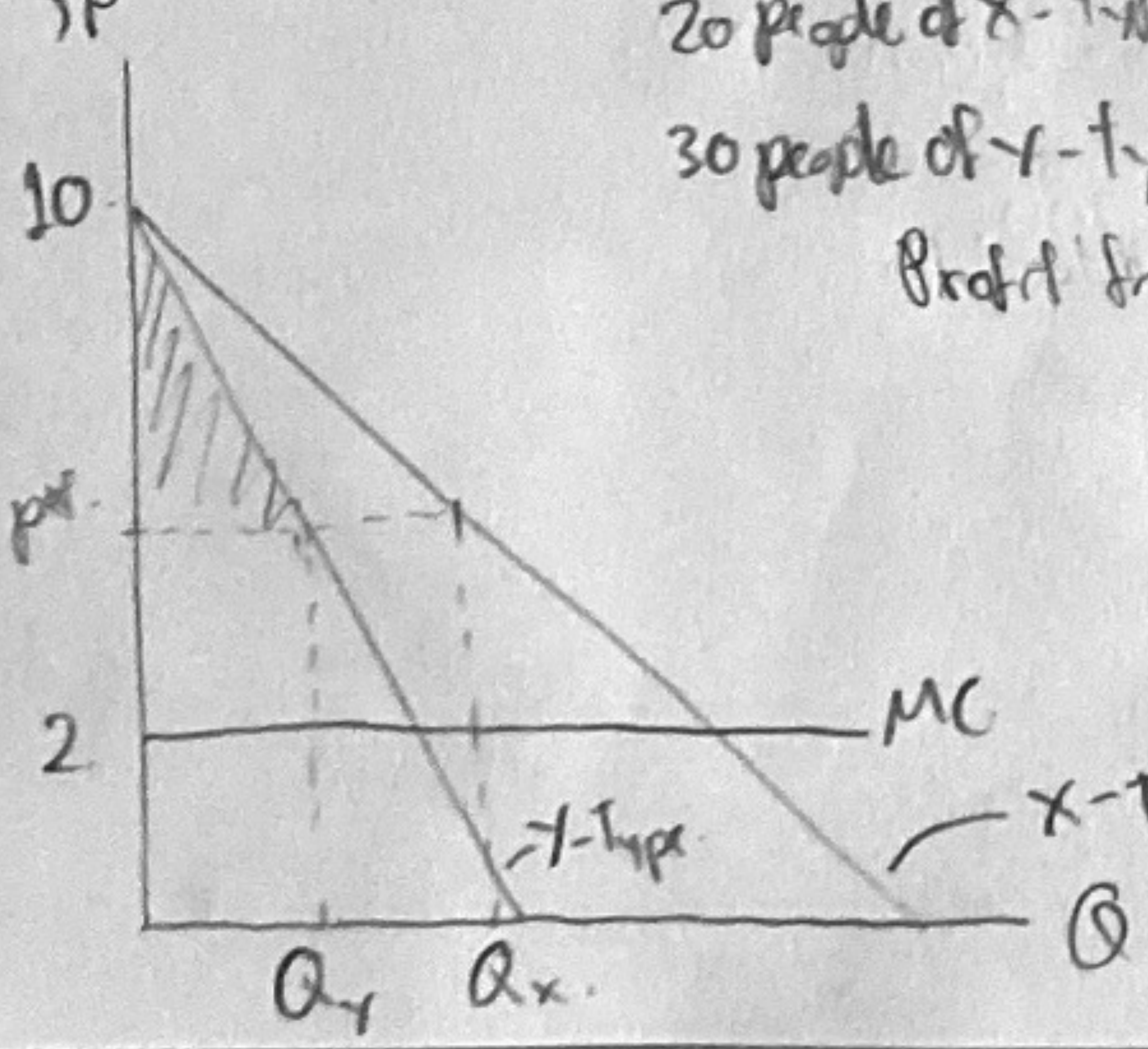

20 people of X-type ; $P = 10 - Q_X$

30 people of Y-type : $P = 10 - 2Q_Y$

Profit from entry fee : $50 \times \left[\frac{1}{2} \times Q_Y \times (10 - p^d)\right] = 25\left(5 - \frac{p^d}{2}\right)(10 - p^d)$

$= 25\left[50 - 5p^d - 5p^d + \frac{p^{d2}}{2}\right] = \frac{25}{2}\left[100 - 20p^d + p^{d2}\right]$

Profit from per-drink price $= 30(p^d - MC)(Q_Y) + 20(p^d - MC)(Q_X)$

$= 30(p^d - 2)\left(5 - \frac{p^d}{2}\right) + 20(p^d - 2)(10 - p^d)$

Total profit $= \frac{25}{2}(100 - 20p^d + p^{d2}) + (p^d - 2)(150 - 15p^d + 200 - 20p^d$

$\frac{25}{2}(10$

Total profit $= \frac{25}{2}(100 - 20p^d + p^{d^2}) + (p^d - 2)(350 - 35p^d)$

Find p^d that maximize profit: $\frac{d\pi}{dp^d} = 0.$

$$\frac{25}{2}(-20) + 2p^d + 350 - 70p^d + 70 = 0$$

$$-250 + 2p^d + 350 - 70p^d + 70 = 0.$$

$$68p^d = 170.$$

$$p^d = 2.5$$

$\therefore$ The optimal per drink price is \$2.5

The only fee price is $\frac{703.125}{50} = \$14.0625.$

The optimal profit that the firm can make from 50 customers is $703.125 + (0.5)(350 - 87.5)$ $= \$834.375$

14). The demand in Europe: $Q_E = 70 - P_E$ so the inverse demand in Europe: $P_E = 70 - Q_E$, $MR_E = 70 - 2Q_E$.

The demand in US: $Q_U = 110 - P_U$ so the inverse demand in US: $P_U = 110 - Q_U$; $MR_U = 110 - 2Q_U$.

a). Find Q_U that maximize profit: $MR_U = MC$

$$110 - 2Q_U = 10.$$

$$2Q_U = 100.$$

$$Q_U = 50$$ so the price that maximize its profit in US is $100 - \cancel{50} = 50$.

Find Q_E that maximize profit: $MR_E = MC$

$$70 - 2Q_E = 10.$$

$$2Q_E = 60.$$

$$Q_E = 30.$$

So the price that maximize its profit in Europe is $70 - 30 = 40$.

b.). $Q = Q_E + Q_U$.

$Q = 70 - P_E + 110 - P_U$ since the firm must set only 1 price so $P_E = P_U = P$.

$Q = 180 - 2P$

Inverse demand: $P = 90 - \frac{1}{2}Q$

So $MR = 90 - Q$

To find maximum profit: $MR = MC$

$$90 - Q = 10.$$

$$Q = 80.$$

So the price should be $90 - \frac{1}{2}(80) = 50$.

The profit that it will get is $50(80) - 10(80) = 3{,}200$.

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20.) The demand for elderly market: $Q_1 = 750 - 4P_1$, Inverse demand: $P_1 = 187.5 - \frac{1}{4}Q_1$

$MR_1 = 187.5 - \frac{1}{2}Q_1$

The demand for younger: $Q_2 = 850 - 2P_2$, Inverse demand: $P_2 = 425 - \frac{1}{2}Q_2$

$MR_2 = 425 - Q_2$

Find Q_1 that maximize profit: $MR_1 = MC$

$187.5 - \frac{1}{2}Q_1 = 40$

$\frac{1}{2}Q_1 = 147.5$

$Q_1 = 295$

So $P_1 = 113.75$

Find Q_2 that maximize profit: $MR_2 = MC$

$425 - Q_2 = 40$

$Q_2 = 385$

So $P_2 = 232.5$

∴ In elderly market, the profit-maximizing number of passengers is 295 and the price is 113.75

In younger market, the profit-maximizing number of passengers is 38.5 and the price is 232.5

21.) a.) $MC_H = 300$, $MC_A = 300$.

The optimal price of $P_A = 800$ and $P_H = 800$

As we will get the profit equals to $\pi = (800 - 300) + (800 - 300) = 1{,}000$.

b.) $P_B = 900$. as everyone will buy it. since it is affordable,

c.) If follow the mixed bundling strategy, $P_A = 800$; $P_H = 800$; $P_B = 1{,}000$

As $P_H = 800$ will attract customer 1 which yield the profit of $800 - 300 = 500$

$P_A = 800$ will attract customer 3 which give the profit of $800 - 300 = 500$.

and $P_B = 1{,}000$ will be bought by customer 2 which yields. $1{,}000 - 600 = 400$ profit

Therefore, the profits that we earn is $500 + 500 + 400 = 1{,}400$.