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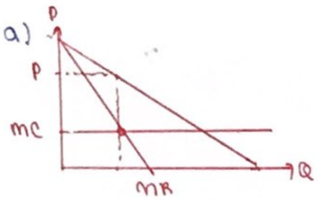
(17) $MC = 10$, no fixed cost

Europe : $Q_E = 70 - P_E$ → $P_E = 70 - Q_E$ $MR_E = 70 - 2Q_E$

US $Q_u = 110 - P_u$ → $P_u = 110 - Q_u$ $MR_u = 110 - 2Q_u$

a)



∴ $MR_E = MC$ find Q_E, $MR_u = MC$ find Q_u

$70 - 2Q_E = 10$ $110 - 2Q_u = 10$

$Q_E = \frac{60}{2} = 30$ $Q_u = \frac{100}{2} = 50$

∴ $P_E = 70 - 30 = 40$ $P_u = 110 - 50 = 60$

with 3rd degree discrimination the firm should set MR=MC in each market to determind the price and quantity. so, we get profit

$\Pi_E = (P_E - MC)\,Q_E = (40-10)\,30 = 900$

$\Pi_u = (P_u - MC)\,Q_u = (60-10)\,50 = 2500$ } 3,400 #

b) let $Q = Q_u + Q_E$ total demand the firm will face

capacity constraints

$Q = 70 - P^* + 110 - P^*$

$= 180 - 2P^*$

$P^* = 180/2 - Q/2$; inverse demand

$MR = 90 - Q$; MR

$Q = 80$; MR=MC

$P^* = 90 - 40 = 50$; price

$Q_E = 70 - 50 = 20$; sell Q_E

$Q_u = 110 - 50 = 60$; sell Q_u

$\Pi = (P^* - MC)\,Q = (50-10)80 = 3,200$; profit #

20) 500 passenger. $MC = 40$ $Q_1 = 750 - 4P_1$ → $P_1 = \frac{750}{4} - \frac{Q_1}{4}$ (inverse demand) → $MR_1 = 187.5 - \frac{Q_1}{2}$ (MR)

$Q_2 = 850 - 2P_2$ $P_2 = \frac{850}{2} - \frac{Q_2}{2}$ $MR_2 = 425 - Q_2$

1) limited capacity

$Q_1 + Q_2 = 500$

2) Equate MRs

$MR_1 = MR_2$

$187.5 - \frac{Q_1}{2} = 425 - Q_2$

$Q_2 - \frac{Q_1}{2} = 237.5$

3) $Q_1 + 237.5 + \frac{Q_1}{2} = 500$

$\frac{3}{2}Q_1 = 262.5$

$Q_1 = 175.$ → $P_1 = 187.5 - \frac{175}{4} = 143.75$ # plug back in to inverse demand

then $500 - 175 = Q_2 = 325$ → $P_2 = 425 - \frac{325}{2} = 262.5$ #

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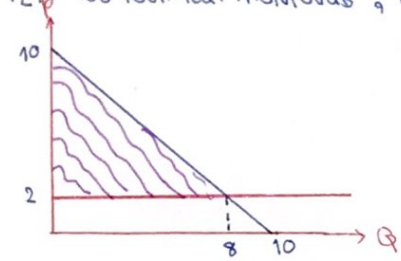
12) 100 identical individuals, $P = 10 - Q$, fixed cost = 1,200, MC = 2



This is Two-part tariff

1) firm sets Price = MC, To maximize the sum of consumer. means that usage charge per unit is 2.

2) firm charge subscription price equal to the consumer surplus

$\triangle CS = \frac{1}{2}(10-2)\cdot 8 = \frac{64}{2} = 32$ → consumer will be willing to buy as long as the subscription charge is less than 32

fix cost 1,200 means that we need to charge subscription to 100 customer with price = 12

CS = 32 - 12 = 20 consumer surplus has left

∴ the total revenue of firm = total revenue from subscription charge plus total revenue from usage charge, Total revenue will cover total cost and the firm will earn zero economic profit #

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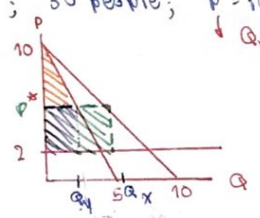
12)

x ; 20 people ; $P = 10 - Q$ → $Q_x = 10 - p^*$

y ; 30 people ; $P = 10 - 2Q$ → $Q_y = \frac{10}{2} - \frac{p^*}{2} = 5 - \frac{p^*}{2}$

MC = AC = \$2 per drink



1) we have to find the total profit from the entry fee

$= 50\left(\frac{1}{2}\cdot(10-p^*)\cdot Q_y\right)$

$= 50\left(5 - \frac{p^*}{2}\right) Q_y$

$= 50\left(5 - \frac{p^*}{2}\right)\left(5 - \frac{p^*}{2}\right)$

$= 50\left(5 - \frac{p^*}{2}\right)^2$

2) total profit from per-drink price

$= \boxed{\ }\cdot 30 + \boxed{\ }\cdot 20$

$= Q_y(30)(p^*-2) + 20\cdot Q_x\cdot(p^*-2)$

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

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

$= (p^*-2)\left[150 - 15p^* + 200 - 20p^*\right]$ $(350 - 35p^*)$

$= 350p^* - 35p^{*2} - 700 + 70p^*$

3) total profit

$= 50\cdot\left(5 - \frac{p}{2}\right)^2 + \left[(30)\left(5 - \frac{p^*}{2}\right) + 20(10-p^*)\right](p^*-2)$

$= 50\cdot\left(5 - \frac{p^*}{2}\right)^2 - 35p^{*2} + 420p^* - 700$

4) Find p^* that maximize total profit

$\frac{d\Pi}{dp} = 0$; $100\left(5 - \frac{p^*}{2}\right)\left(-\frac{1}{2}\right) - 70p + 420 = 0$

$-\frac{500}{2} + \frac{50p^*}{2} - 70p + 420 = 0$

$-250 + 25p^* - 70p^* + 420 = 0$

$170 - 45p = 0$

$p \approx 3.778$

∴ the optimal entry free is $\frac{1}{2}\cdot\left(5 - \frac{3.778}{2}\right)\cdot(10 - 3.778)$

$= 9.678321 \approx 9.678$ #

per drink price is 3.778 #

Total profit $= 50\cdot\left(5 - \frac{3.778}{2}\right)^2 - 35(3.778)^2 + 420(3.778) - 700$

$= 483.916 - 499.569940 + 1,586.760 - 700$

$= 871.11$ #

22 monopoly $MC_H = 300$, $MC_A = 300$

without bundle

I) $P_A = 100$ $P_H = 800$

$Q_A = 3$ $Q_H = 1$

$MC_A = 300$ $MC_H = 300$

$\pi = -200(3) + 500 = -100$

II) $P_A = 500$ $P_H = 500$

$Q_A = 2$ $Q_H = 2$

$MC_A = 300$ $MC_H = 300$

$\pi = 200 \cdot 2 + 200 \cdot 2 = 800$

III. $P_A = 100$ $P_H = 500$

IV $P_A = 100$ $P_H = 100$

V P_A 500 $P_H = 800$

VI 500 100

VII

$(900 - 600) \cdot 3 = 900$

V) $P_A = 500$ $P_H = 800$

$Q_A = 2$ $Q_H = 1$

$\pi = 200(2) + 500 = 900$

VII) $P_A = 800$ $P_H = 800$

$Q_A = 1$ $Q_H = 1$

$\pi = 500 + 500 = 1000$

a) without bundling, the best the firm can do is set the price of both service = 800.
In each of service will attract only one customer and earns profit of $ 500 from each for a total profit of $1000 #

b) The firm can charge a price of $ 900 for both service. firm will have 3 customers and earn profit of $300 from each for a total profit of $900. If the firm set price equal 1000, it would only attract one customer and total profit would be $400. #

c) customer 1 and 3 has willingness to pay below marginal cost
the firm should charge $ 800 for airfare or hotel only and $1,00 for the bundle
Then custome 1 will purchase hotel only
customer 3 will purchase airfare only
customer 2 will purchase both service
profit = $1 400 #