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Exercise 5

6.1 $Q_D = 21 - 3.5P \Rightarrow P = 6 - \frac{1}{3.5}Q$.

13 people $\Rightarrow P_{total_1} = 78 - \frac{26}{7}Q$.

6.2 $Q_D = 12 - 2P \Rightarrow P = 6 - \frac{1}{2}Q$.

9 people $\Rightarrow P_{total_2} = 54 - \frac{9}{2}Q$.

MP = 16 = SMC

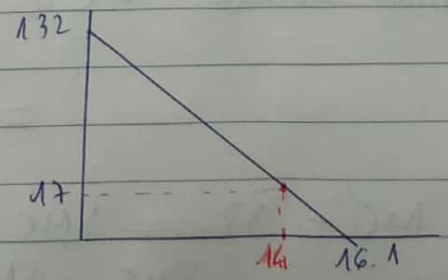
$SMB = P_{t_1} + P_{t_2} = 132 - \frac{115}{14}Q$.

. Optimal at SMB = SMC

$\Rightarrow 132 - \frac{115}{14}Q = 16 \Rightarrow Q = 14.12$.

at 14 bus stops

Benefit $= \frac{(132 + 17) \times 14}{2} = 1043$



Cost = 14 x 16 = 224

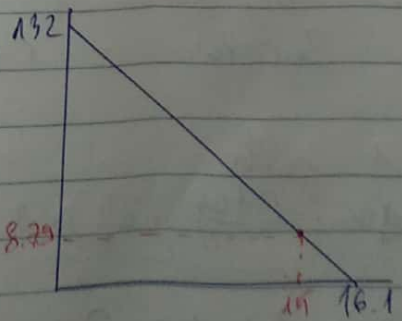
$\Rightarrow$ SSurplus = 819

at 15 bus stops

Benefit $= \frac{(132 + 8.79) \times 15}{2} = 1055.9$

Cost = 15 x 16 = 240

$\Rightarrow$ SSurplus = 815.9



$\Rightarrow$ optimal Amount = 14

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Exercise 6

$Q_m = 26 - 6P \Rightarrow P_m = \frac{13}{3} - \frac{1}{6}Q$.

$Q_n = 18 - 2P \Rightarrow P_n = 9 - \frac{1}{2}Q$.

$Q_o = 4 - P/4 \Rightarrow P_o = 16 - 4Q$.

$Q_p = 2 - P/3 \Rightarrow P_p = 6 - 3Q$.

$MC = 32$

a) $m = n = o = p = \frac{32}{4} = 8$.

at $P = 8$: $Q_m = 0$. $Q_o = 2$

$Q_n = 2$ $Q_p = 0$

⇒ Goverment will build 2 bus paths

b) $m + n + o + p = 32$.

Total Social DC $= P_m + P_n + P_o + P_p$

$= \frac{106}{3} - \frac{23}{3}Q = SMB$

$MC = 32 = SMC$

$SMC = SMB$

$\Rightarrow \frac{106}{3} - \frac{23}{3}Q = 32 \Rightarrow Q = 0.43$ /6

- at 0 bus paths

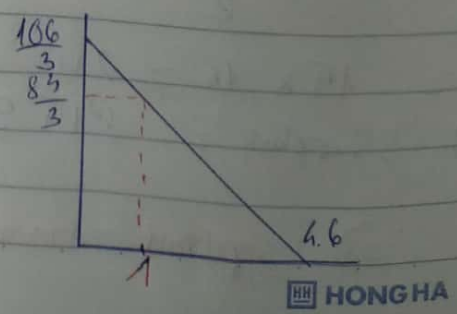
Surplus = Cost = benefit = 0

- at 1 path

benefit $= \frac{(\frac{106}{3} + \frac{83}{3}) \times 1}{2} = 31.5$

Cost $= 32 \times 1 = 32$

⇒ SSurplus $= -0.5$ ~~bài~~



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socially
⇒ optimal Path = 0.

at Q=0

$P_M = \frac{13}{3}$; $P_N = 9$; $P_O = 10$; $P_P = 6$

total = 35.3 ⇒ able to achive socially optimal amount.

Sung Exercise 4

$Q_O = 24 - 6P$; $Q_E = 13 - 4P$

because PRIVATE GOODS ⇒ summed horizontally.

SMB = total DC = $37 - 10P$

if public, summed vertically.

$P_O = 4 - \frac{1}{6}Q$; $P_E = \frac{13}{4} - \frac{1}{4}Q$

⇒ SMB = $\frac{29}{4} - \frac{5}{12}Q$

Exercise 6.3

$Q_H = 18 - 4P \Rightarrow P_H = \frac{9}{2} - \frac{1}{4}Q$

$Q_J = 25 - 3P \Rightarrow P_J = \frac{25}{3} - \frac{1}{3}Q$

$Q_K = 12 - \frac{1}{2}P \Rightarrow P_K = 24 - 2Q$

MC = 30

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① taxed evenly $h = j = k = \frac{30}{3} = 10$

at $P = 10$; $Q_h = 0$; $Q_J = 0$

$Q_K = 7 \Rightarrow$ Government builds 7 (largest asked by any resident)

② $h + j + k = 30$.

total Social DC $= P_h + P_J + P_K$

$= \frac{221}{6} - \frac{31}{12}Q = SMB$.

$SMB = SMC = MD$

$\Leftrightarrow \frac{221}{6} - \frac{31}{12}Q = 30 \Rightarrow Q = 2.6 \begin{matrix} \nearrow 2 \\ \searrow 3 \end{matrix}$

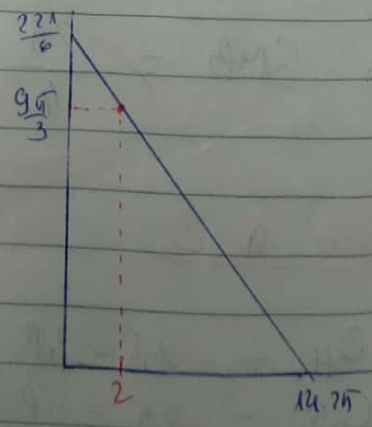
. at 2 traffic signs.

benefit $= \left(\frac{221}{6} + \frac{95}{3}\right) \times 2 \times \frac{1}{2}$

$= 68.5$.

Cost $= 30 \times 2 = 60$

$\Rightarrow$ SSurplus $= 8.5$.



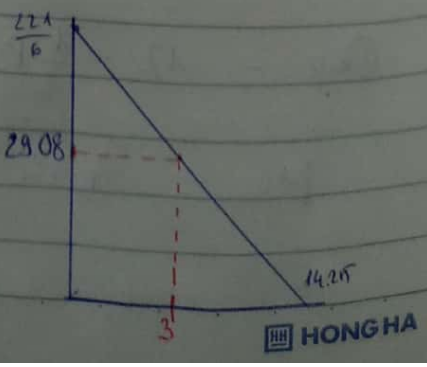
. at 3 traffic signs.

benefit $= \left(\frac{221}{6} + 29.08\right) \times 3 \times \frac{1}{2}$

$= 98.87$

Cost $= 3 \times 30 = 90$

$\Rightarrow$ SSurplus $= 8.87$ ← choose 3 signs



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at 3 Signs

$P_H = \frac{15}{4}$; $P_T = \frac{22}{3}$; $P_K = 16$

total = 29.08 < 30

⇒ It's not possible to achieve social optimum.

Exercise 2

Group 1: $Q_D = 35 - 5P \Rightarrow P = 7 - \frac{1}{5}Q$

27 people ⇒ $P_{t1} = 189 - \frac{27}{5}Q$

Group 2: $Q_D = 16 - 3.2P \Rightarrow P = 5 - \frac{1}{3.2}Q$

12 people ⇒ $P_{t2} = 60 - \frac{15}{4}Q$

Sewer cost = 22 = SMC

$SMB = P_{t1} + P_{t2} = 249 - \frac{183}{20}Q$

SMB = SMC

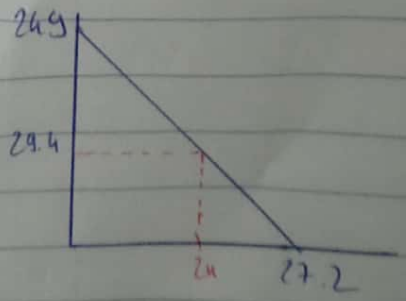
$\Leftrightarrow 249 - \frac{183}{20}Q = 22 \Rightarrow Q = 24.8 \approx 24$

at 24 sewers

Benefit $= \frac{(249 + 29.4) \times 24}{2} = 3340.8$

Cost $= 22 \times 24 = 528$

⇒ Surplus = 2812.8



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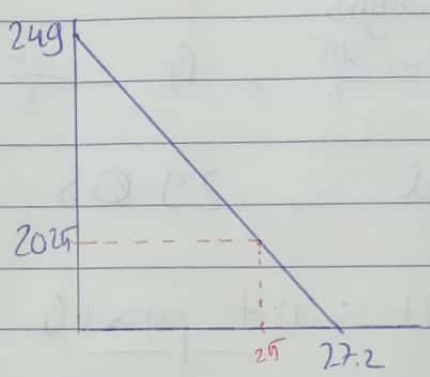
at 25 sewers.



$$\text{Benefit} = \frac{(249 + 20.25) \times 25}{2}$$

$$= 3365.625$$

$$\text{Cost} = 22 \times 25 = 550$$

$$\Rightarrow \text{SSurplus} = 2815.625$$

$\Rightarrow$ optimum amount at 25 sewers.

, Exercise 1

$$Q_m = 35 - 5P \; ; \quad Q_E = 18 - 2P.$$

a) if clothes are private goods.

$$SMB = Q_m + Q_E = 53 - 7P.$$

b) if clothes are public.

$$P_m = 7 - \frac{1}{5}Q \; , \quad P_E = 9 - \frac{1}{2}Q$$

$$SMB = P_m + P_E = 16 - \frac{7}{10}Q.$$

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