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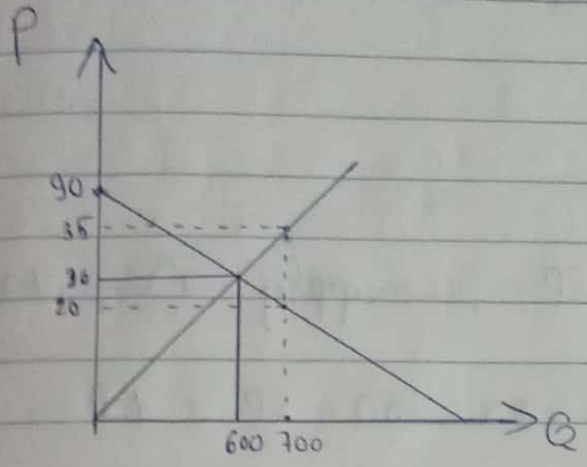
Question 4:

Demand $Q = -10P + 900$; Supply $Q = 20P$



$Q_D = Q_S$

$\Leftrightarrow -10P + 900 = 20P$

$\Leftrightarrow P_E = 30$

$\Rightarrow Q_E = 600$

$\Rightarrow$ Consumer surplus : $\frac{1}{2} \times (90-30) \times 600 = 18000$

Producer surplus : $\frac{1}{2} \times 30 \times 600 = 9000$

$\Rightarrow$ total = 27,000

* Subsidy \$15

$\Rightarrow Q_S^* = 20(P+15) \Leftrightarrow 20P + 300$

$Q_S^* = Q_D \Leftrightarrow 20P + 300 = -10 + 900$

$\Rightarrow P^* = 20.$

~~$\Rightarrow (P^*) = 30 + (30 - 20)$~~ *

$P^* = 35$; new $Q = 20 \times 35 = 700.$

New Consumer surplus $\frac{1}{2}(90-20) \times 700 = 24500.$

New Producer surplus $\frac{1}{2} \times 35 \times 700 = 12250.$

Goverment lost $= 15 \times 700 = 10500.$

$\Rightarrow$ DWL $= 27000 - (24500 + 12250 - 10500) = 750$

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⇒ there is a DWL beccause Goverment lost more than the actual amount received.

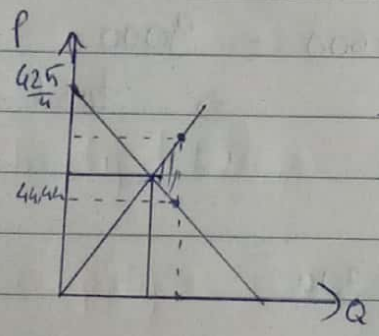
Question 4.1

Demand $Q = 850 - 8P$; Supply $Q = 10P$

⇒ Equlibrium : $Q_D = Q_S \Leftrightarrow 850 - 8P = 10P$.

$$\Rightarrow P_E = \frac{425}{9} = 47{,}22 \Rightarrow Q_E = \frac{4250}{9} = 472{,}22$$

(47.22) (472.22)



+ Con Surplus : $\frac{1}{2} \times \left(\frac{425}{4} - \frac{425}{9}\right) \times \frac{4250}{9}$

$= 13937{,}11$

+ Producer Surplus $= \frac{1}{2} \times \frac{425}{9} \times \frac{4250}{9}$

$= 1114{,}69$

* Subsidy $5

⇒ new supply: $Q = 10(P+5) = 10P + 50$.

$10P + 50 = 850 - 8P \Rightarrow P^* = 44{,}444$

$\Rightarrow (P^{*'}) = 47{,}22 + (5 - (47{,}22 - 44{,}44))$

$= 49{,}44$

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$\Rightarrow Q^* = 10 \times 49,44 = 494,4$.

- new Consumer surplus: $\frac{1}{2} \times \left(\frac{425}{4} - 44,44\right) \times 494,4$

$= 15279,4$

- new ~~profit~~ producer surplus: $\frac{1}{2} \times 49,44 \times 494,4$

$= 12221,57$.

- Goverment lost: $5 \times 494,4 = 2472$.

~~DWL = $\frac{(494,4 - 472,22) \times 5}{2}$ = [illegible]~~

$|DWL| = (15279 + 12221,57) - 2472 - 13977,11$
$- 11149,69 =$

$= 58,23$

- total supplus received by producer and comsumer is less than amount paid by the government

$\Rightarrow$ DWL

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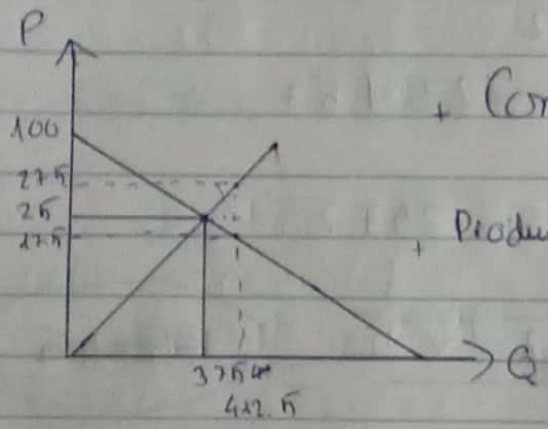
Question 4.2

Demand: $Q_D = 500 - 5P$; Sup: $Q = 15P$

$\Rightarrow$ Equilibrium: $Q_D = Q_S \Leftrightarrow 500 - 5P = 15P$

$\Rightarrow P_E = 25$; $Q_E = 375$.



+ Consumer surplus: $\frac{1}{2} \times 75 \times 375 = 14625$

+ Producer surplus: $\frac{1}{2} \times 25 \times 375 = 4687.5$

$\Rightarrow$ total: 18750.

* Subsidy \$10

new supply $Q'_S = 15(P+10) = 15P + 150$

$Q'_S = Q_D \Leftrightarrow 15P + 150 = 500 - 5P$

$\Rightarrow P^* = 17.5$

$\Rightarrow (P^*)' = 27.5 \Rightarrow Q^* = 27.5 \times 15 = 412.5$.

+ New consumer surplus $\frac{1}{2}(100 - 17.5) \times 412.5 = 17015.625$

+ New producer surplus: $\frac{1}{2} \times 27.5 \times 412.5 = 5671.875$

+ Gouvernat lost: $10 \times 412.5 = 4125$

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$\Rightarrow DWL = \frac{1}{2} \times (4125 - 375) \times 10 = 187.5$

Amount paid by government is less than amount of surplus added.

$\Rightarrow DWL$

Question 5

$Q_S = \frac{100}{8} P$; $P_D = 400 - 2.92 Q_D$

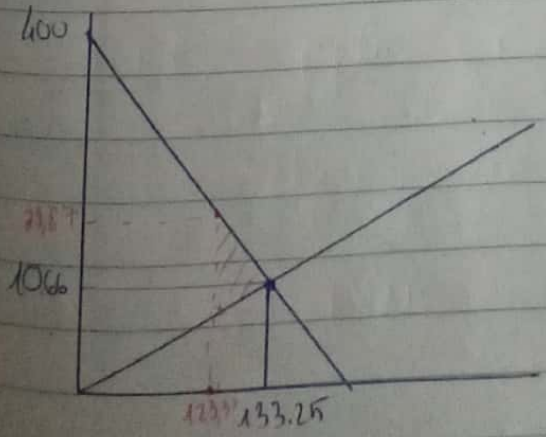
$\Rightarrow Q_D = \frac{400}{2,92} - \frac{1}{2.92} P_D$

Equilibrium $Q_S = Q_D$

$\Leftrightarrow \frac{100}{8} P = 136.98 - \frac{1}{2.92} P$

$\Leftrightarrow 12,84P = 136\ 98 \Rightarrow P_E = 10.66$

$Q_E = 133\ 25$



+ C surplus $= \frac{1}{2} \times (400 - 10.66) \times 133.25$

$= 25939.78$

+ P surplus $= \frac{1}{2} \times 10.66 \times 133\ 25$

$= 710$

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b) Tax: $t = 30$.

Qs New tax supply curve $Q_s^t = \frac{100}{8}(P - 30)$

$\Leftrightarrow Q_s^t = \frac{100}{8}P \Rightarrow$ ~~17.5~~ $.375$

* New equilibrium.

$Q_s^t = Q_D \Leftrightarrow \frac{100}{8}P - 37.5 = 136.98 - \frac{1}{2.92}P$

$\Leftrightarrow 12,84P = 511.98 \Rightarrow P_E' = 39.87$

$\Rightarrow P_E' = 39.87 \Rightarrow Q_E' = 123,37$

$\Rightarrow$ Government Tax revenue $= 30 \times 123,37$

$\Rightarrow 3701.1$

$\Rightarrow DWL = \frac{1}{2} \times 30 \times (133.25 - 123,37)$

$= 148.2$

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5.1

$$Q_S = \frac{200}{12}P \;,\quad P_D = 500 - 5Q_D.$$

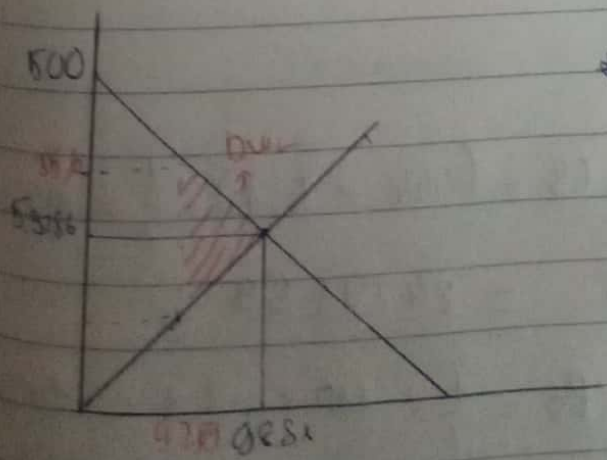
$$\Rightarrow P_S = \frac{Q_S \cdot 200}{12} \cdot \frac{Q_S \cdot 12}{200} = 0.06\,Q_S.$$

Equilibrium: $P_S = P_D$

$$\Leftrightarrow 0.06\,Q_S = 500 - 5Q_D.$$

$$\Rightarrow \begin{cases} Q_E = 9881 \\ P_E = 5.9286 = 5.93 \end{cases}$$

$$\Rightarrow \begin{cases} C_S = \frac{1}{2} \times (500 - 5.93) \times 9881 = 24409 \\ P_S = \frac{1}{2} \times 5.93 \times 9881 = 293. \end{cases}$$



* tax $t = 28$.

→ new S-curve: $P_S - 30 = 0.06Q_S$

$$\Leftrightarrow P_S = 0.06Q_S + 30$$

$$0.06Q_S + 30 = 500 - 5Q_D$$

New equilibrium $\begin{cases} P_E' = 35.5734 = 35.6 \\ Q_E' = 92,89 \end{cases}$

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⇒ Government tax revenue:

$= 28 \times 92.89 = 2600.9$

⇒ DWL

$= (98.89 - 92.89) \times 28 \times \frac{1}{2}$

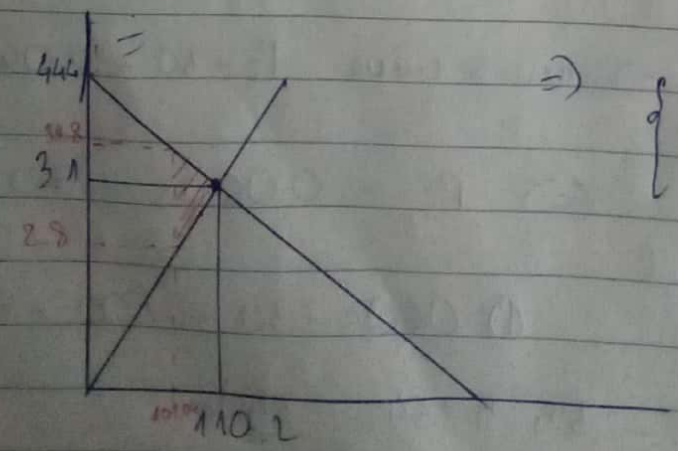
$= 84.$

(5.2) $Q_S = 36P \Rightarrow P = \frac{1}{36} Q_S.$

$P = 444 - 4Q_D$

Equilibrium: $P_S = P_D \Leftrightarrow \frac{1}{36} Q_S = 444 - 4Q_D$

$\Rightarrow \begin{cases} Q_E = 110.2 \\ P_E = 3.1 \end{cases}$



$\Rightarrow \begin{cases} CS = (444 - 3.1) \times \frac{1}{2} \times 110.2 \\ = 24293.59 \end{cases}$

$P_S = \frac{1}{2} \times 110.2 \times 3.1 = 170.81$

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* tax $t = 37$

$$P - 37 = \frac{1}{36} Q_S \quad *$$

$$\Rightarrow P^* = \frac{1}{36} Q_S + 37$$

New equilibrium: $\frac{1}{36} Q + 37 = 444 - 4Q$

$$\Rightarrow \begin{cases} Q'_E = 101.04 \\ P'_E = 39.8. \end{cases}$$

$$\Rightarrow \text{new } CS = \frac{1}{2} \times (444 - 39.8) \times 101.04$$

$$= 20420.$$

$$\text{new } PS = \frac{1}{2} \times 2.8 \times 101.04 = 141.456$$

$$\Rightarrow \begin{cases} \text{Goverment tax revenue} = 101.04 \times 37 = 3738.48 \\ DWL = \frac{1}{2} \times (110.2 - 101.04) \times 37 \\ = 169.46 \end{cases}$$