3

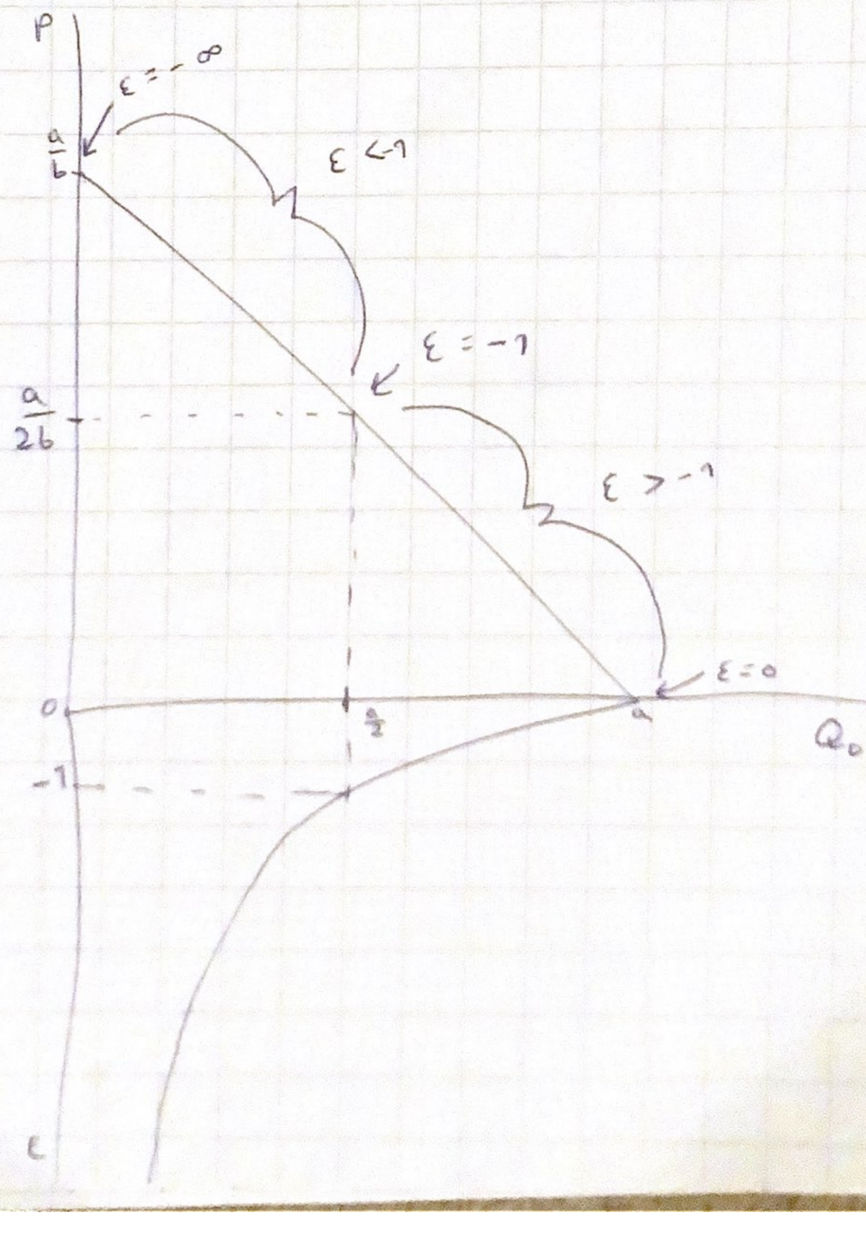
$$Q_D = a - bP$$

$$P = \frac{a}{b} - \frac{1}{b} Q_D$$

$$\varepsilon = -b \cdot \frac{P}{Q_D}$$

$$\varepsilon = -b \cdot \frac{\frac{a}{b} - \frac{1}{b} \cdot Q_D}{Q_D}$$

$$\varepsilon = -b \cdot \left(\frac{a}{b\,Q_D} - \frac{1}{b}\right) = -\frac{a}{Q_D} + 1$$



if $\varepsilon = -1$

$$-1 = -\frac{a}{Q_D} + 1$$

$$-2 = -\frac{a}{Q_D}$$

$$Q_D = \frac{1}{2}a \rightarrow P = \frac{a}{b} - \frac{1}{b} \cdot \frac{1}{2}a$$

$$P = \frac{a}{2b}$$

(so exactly the midpoint)

~~At the left side of the graph~~

When $Q_D = 0$, ε goes to $-\infty$. that makes sense, if the demand ~~goes~~ is near 0 and the price goes up by 1%, the demand will go to 0 so it goes down by $-\infty$%.

When $P = 0$, $\varepsilon = 0$. this also makes sense because when P goes up by 1% it stays 0, so Q_D does not change either.

Q. 4

a. $\log(Q_s) = 10 + 2\log(P)$

$\log P = -5 + \frac{1}{2}\log Q_s$

$P = 10^{-5+\frac{1}{2}\log(Q_s)} = 10^{-5} \cdot \sqrt{Q_s}$

B. $$\frac{d(\log Q_s)}{dP} = \frac{2}{P}$$

$$\frac{dQ}{dP} \cdot \frac{1}{Q} = \frac{2}{P}$$

$$\varepsilon = \frac{dQ}{dP} \cdot \frac{P}{Q} = 2$$

So ~~as~~ the elasticity is 2 everywhere, it is unitary.

(if the logs were not ln, then it would be)

$$\cancel{\frac{d(\log Q_s)}{dP} = \frac{2}{\ln(10) \cdot P}} \qquad \frac{d}{dP} \cdot \log(Q_s) = \frac{2}{\ln(10) \cdot P}$$

$$\frac{dQ}{dP} \cdot \frac{1}{\cancel{\ln(10)} \cdot Q} = \frac{2}{\cancel{\ln(10)} \cdot P}$$

So it's the same

However, what you probably want me to do:

$P = 10^{-5} \cdot \sqrt{Q_s}$ | $Q_s = 10^{10} \cdot P^2$

$$\varepsilon = \frac{dQ_s}{dP} \cdot \frac{P}{Q_s}$$

$$= 2 \cdot 10^{10} P \cdot \frac{P}{Q_s}$$

$$= 2 \cdot 10^{10} \cdot 10^{-5} \cdot \sqrt{Q_s} \cdot 10^{-5} \cdot \sqrt{Q_s} \cdot \frac{1}{Q_s}$$

$$= 2 \cdot Q_s \cdot \frac{1}{Q_s} = 2$$

So the elasticity is always 2.

Because the elasticity does not change it is legitimate to talk about the elasticity of supply.

(8) a. $P = 0.1$ $\qquad Q = \frac{2}{0.1} = 20$

$\varepsilon = -0.5$

$$\varepsilon = \frac{dQ}{dP} \cdot \frac{P}{Q}$$

$$-0.5 = \frac{dQ}{dP} \cdot \frac{0.1}{20}$$

$$\Rightarrow \frac{dQ}{dP} = -100$$

$\rightarrow$ $Q_D = a - 100P$

$20 = a - 100 \cdot 0.1$

$20 = a - 10$

$a = 30$

$\rightarrow$ $Q_D = 30 - 100P$

B. $a = 0$

$Q_S = b \cdot P$

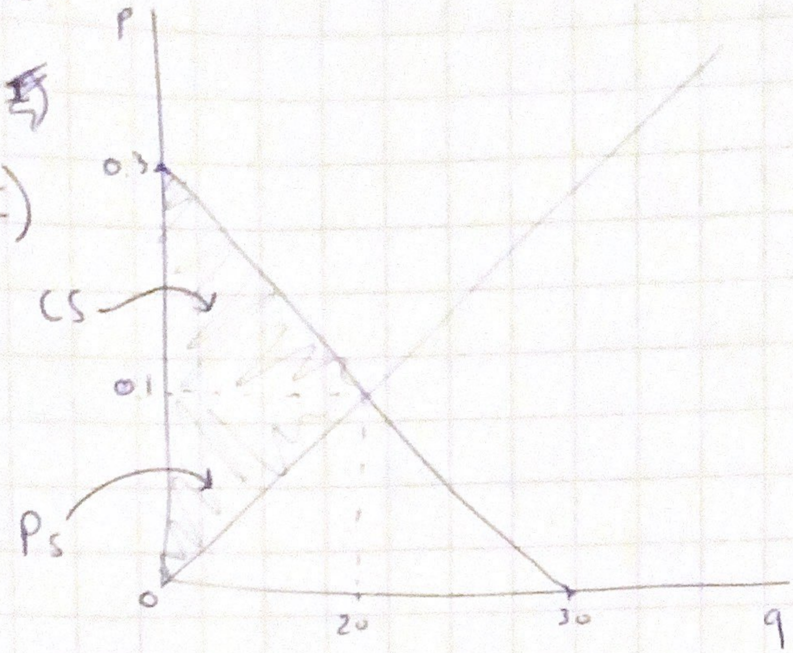
$20 = b \cdot 0.1$

$b = 200$

$\rightarrow$ $Q_S = 200P$

c

III)



$P = 0.3 - 0.01\, Q_D$

$P = 0.005\, Q_S$

I) $CS = \frac{1}{2} \cdot 20 \cdot (0.3 - 0.1) = 10 \cdot 0.2 = 2$ (million Pounds)

the WTP of the consumers was higher than they actually Paid. So the total amount of money that they were willing to Pay But did not is equal to the area of the CS triangle.

II)

$PS = \frac{1}{2} \cdot 20 \cdot 0.1 = 1$ (million Pounds)

the WtA of the Produces is lowe than the amount of money they were actually Paid. So the total amount of money that they got on top of the amount of money they were willing to accept is the PS triangle.

λ. the new price becomes ~~1.2p~~ 1.2 p

III) ~~$Q_s = 200 \cdot 1.2 P = 240 P$~~

~~$P = \frac{1}{240} Q_s$~~

So

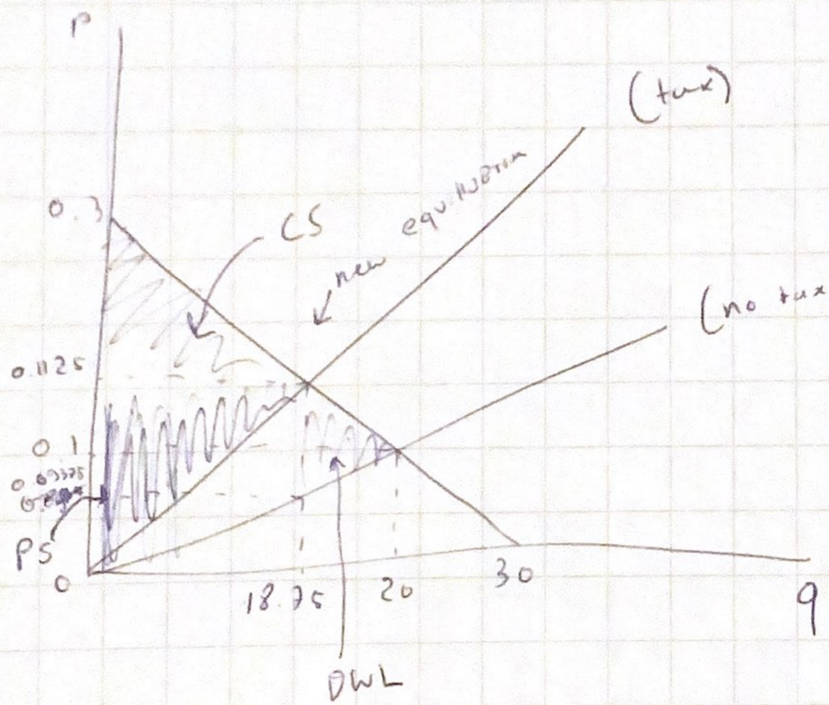
$P_D = 1.2 P_S$

~~$200 \cdot Q = 1.2 \cdot 0.005 Q$~~

$P_S = 0.833 P_D$

$Q_S = 200 \cdot 0.833 P_D = 167 P$

$P = \frac{Q}{167}$



I)

$\cancel{P = 167 Q_S \; 0.006 Q_S \mid P = 0.3 - 0.01 Q_D}$

$\cancel{0.006 Q = 0.3 - 0.01 Q}$

$Q_S = 167P \mid Q_D = 30 - 100P$

$167P = 30 - 100P$

$267P = 30$

$P = 0.1125$

$Q = 30 - 100 \cdot 0.1125 = 18.75$

$\cancel{(PS + CS)_{before} = 1 + 2 = 3}$

$\cancel{PS_{tax} = 0.5 \cdot 18.75 \cdot 0.1125 = 1.0547}$

$\cancel{CS_{tax} = 0.5 \cdot 18.75 \cdot (0.3 - 0.1125) = 1.7578}$

$\cancel{(PS + CS)_{tax} = 2.8125}$

$\cancel{DWL = 3 - 2.8125 = 0.1875}$ ~~million Pound~~

~~this is the total amount of money lost by the producers and consumers~~

$P = 0.005 \cdot 18.75 = 0.09375$

$DWL = \frac{1}{2}(0.1125 - 0.09375)(20 - 18.75) = 0.0117$ million

II) $t = \frac{1}{6} \cdot 0.1125 \cdot 18.75 = 0.352$ million

e ~~After tax revenue~~

Producer incidence $= \frac{1}{2} \cdot (0.1 - 0.09375)(20 - 18.75) = 0.00391$

Consumer incidence $= \frac{1}{2} \cdot (0.1125 - 0.1)(20 - 18.75) = 0.00781$

f.

the $\left|\frac{dQ_D}{dP}\right|$ would be ~~more~~ ~~negative~~ smaller

so CS would be ~~bigger~~ ~~smaller~~, smaller.

~~After taxes the Q would be smaller~~

~~which~~ DWL ~~larger~~ smaller and ~~[illegible]~~ the govt revenue also ~~[illegible]~~ smaller. And consumer incidence would go ~~[illegible]~~ down.

College tute sheet

7

$q^a_D = 10 - P$ $\qquad$ $q^b_D = 10 - \frac{1}{2}P$

$P = 10 - q^a_D$ $\qquad$ $P = 20 - 2q^b_D$