③

$$Q_D = a - bP$$

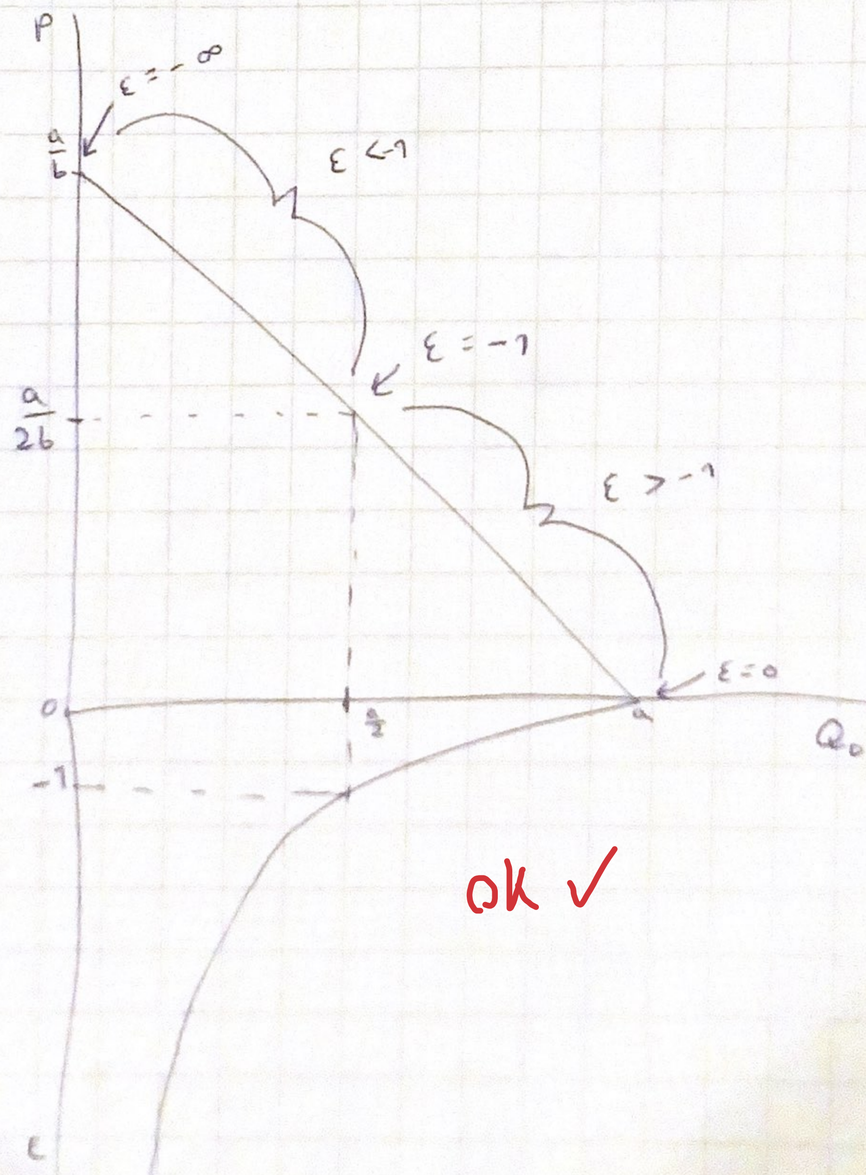
$$P = \frac{a}{b} - \frac{1}{b} Q_D$$

where does this come from? Start from first principles.

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

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

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



OK ✓

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

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

$$\mathcal{E} = \frac{dQ}{dP} \cdot \frac{P}{Q} = 2$$ ✓

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

(if the logs were not ln, then it would be) It won't matter.

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

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

So it's the same ← ah. ok.

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. $P = 0.1$ $Q = \frac{2}{0.1} = 20$

$\varepsilon = -0.5$

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

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

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

$\rightarrow Q_D = a - 100P$

$20 = a - 100 \cdot 0.1$

$20 = a - 10$

$a = 30$

$\rightarrow Q_D = 30 - 100P$ ✓

B. $a = 0$

$Q_S = b \cdot P$

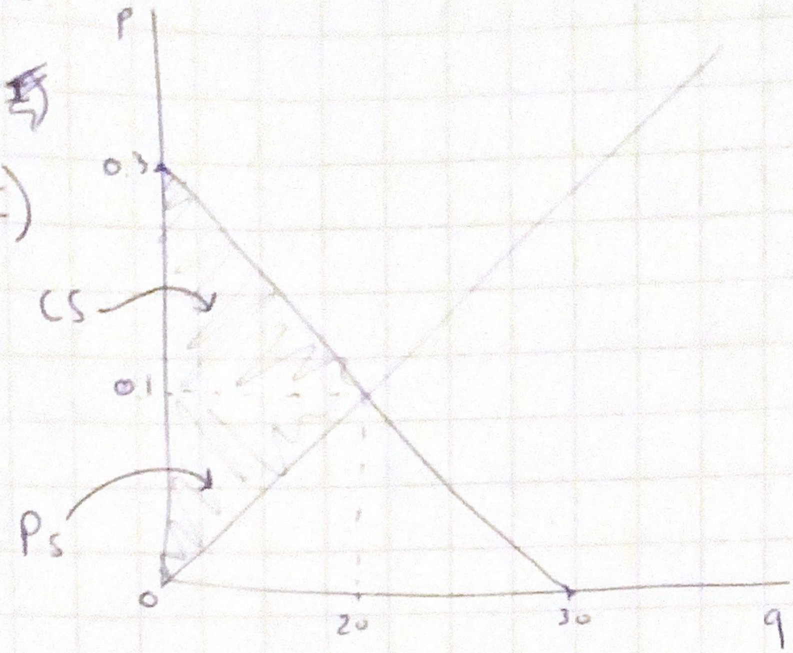
$20 = b \cdot 0.1$

$b = 200$

$\rightarrow Q_S = 200P$

✓

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 Producers is lower 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.

d. Let's say the formal incidence is on the ~~Q~~

III) supplier. then $1.2 Q_{S,VAT} = Q_S$

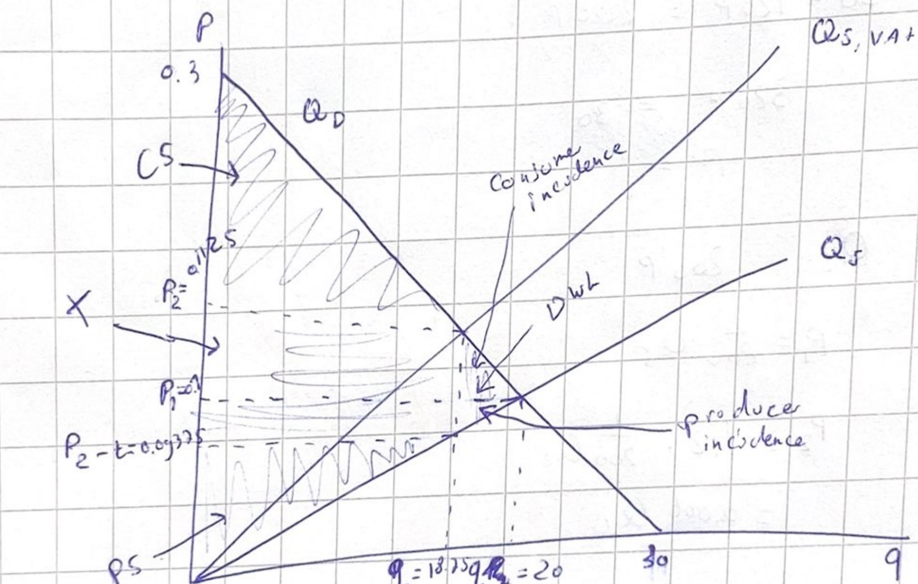
so $Q_{S,VAT} = \frac{1}{1.2} \cdot 200P$

$Q_D = 30 - 100P$

$P_D = 0.3 - 0.01 Q_D$

$Q_{S,VAT} = 166.67P$

$P_{S,VAT} = 0.006 Q_S$



$166.67P_2 = 30 - 100P_2$

$266.67P_2 = 30$

$P_2 = 0.1125$

$q_2 = 30 - 100 \cdot 0.1125 = 18.75$ ✓

~~$\frac{1}{1.2} \cdot 0.1125 = 0.0225$~~

$P_2 - t = \frac{1}{1.2} \cdot 0.1125 = 0.09375$ ✓

$PS = 0.5 \cdot 18.75 \cdot 0.09375 = 0.8789$

$CS = 0.5 \cdot 18.75 \cdot (0.3 - 0.1125) = 1.7578$

$(CS + PS)_{VAT} = 2.6367$

$(CS + PS)_{\text{Before tax}} = 3$

~~DWL = 3 - 2.6367 =~~

II) $t = (0.1125 - 0.09375) \cdot 18.75 = 0.352$ million

I) $DWL = 3 - (2.6367 + 0.352) = 0.0117$ million

e. produce incidence $= 0.5 \cdot (20 - 18.75) \cdot (0.1 - 0.09375)$

$= 0.00391$ ✓

Consume incidence $= 0.5 \cdot (20 - 18.75) \cdot (0.1125 - 0.1)$

$= 0.00781$ ✓

So it is larger for consumers. Question: why is this true in our example?

F. If $|\varepsilon|$ is Bigger, then $\left|\frac{dQ_D}{dP}\right|$ would be smaller (more horizontal). So intuitively, the initial CS would be smaller (smaller triangle). The DWL also smaller Because there is less to lose (and so the consumer incidence would also get smaller).

t would also be smaller Because the intersection with the supply (tax) curve would be lower ($= P_2$ is smaller) ~~So the rectangle becomes~~ and move to the left ($= q_2$ is smaller) so the rectangle becomes smaller.

College fule sheet

(1) $q_D^a = 10 - p$ $\qquad$ $q_D^b = 10 - \frac{1}{2}p$

$p = 10 - q_D^a$ $\qquad$ $p = 20 - 2q_D^b$