Example 3.G: Solve for the market equilibrium using the information in **Example 3.E** and **Example 3.F.** Justify your answer!

2 consumers

A : $Q_A = 10 - P$

B : $Q_B = 10 - \frac{1}{2}P$

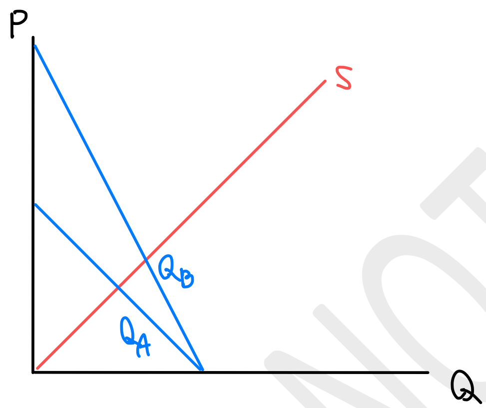
1 sellers

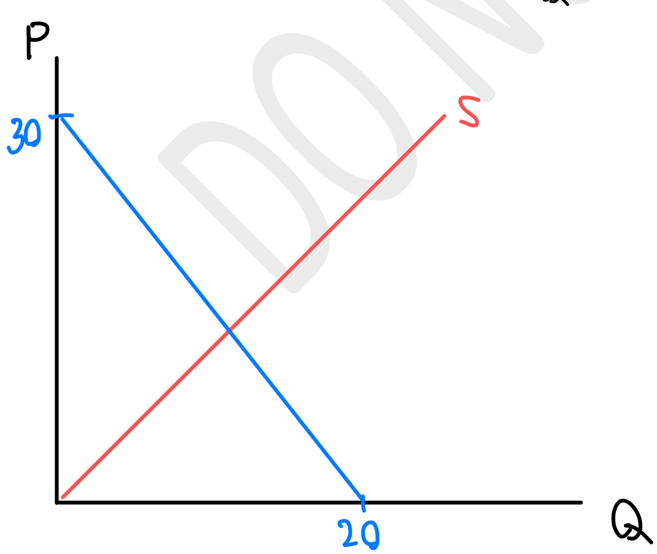
$Q = P$

1. Draw diagram
2. Find eq

A : $P = 10 - Q_A$

B : $P = 20 - 2Q_B$





$$Q^D_{mkt} = Q^D_A + Q^D_B$$

$$= 10 - P + 20 - \frac{1}{2}P$$

$$Q = 30 - \frac{3}{2}P$$

$\therefore$ At Eq $P = 12$ //

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Example 3.J: Excess burden *formula under linear model & Tax-Revenue-maxizing tax rate*

Demand: $p^d = a - bQ^d$; $a \geq 0$, $b \leq 0$.

Supply : $p^s = c + dQ^s$; $d \geq 0$.

- Solve for quantity and prices equilibrium when the unit tax is imposed. Analyze the result

$p^s = p^d - t$; tax on praducer

$p^d = p^s + t$; tax on consumer

$p^s + t = a - bQ^d \rightarrow \boxed{p^s = a - t - bQ^d}$

$p^s = c + dQ^s$

at Eq ; $Q^d = Q^s$

$p^s = p^d \rightarrow a - t - bQ = c + dQ$

$a - t - c = (b+d)Q$

$Q = \frac{a-c}{b+d} - \frac{t}{b+d}$

$\frac{\Delta Q}{\Delta t} = Q_{\text{after tax}} - Q_{\text{before tax}} = \frac{-t}{b+d}$ $\therefore$ when $t\uparrow$, $Q\downarrow$ //

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- Derive the excess burden formula for buyers and sellers

$$t = 0 \longrightarrow t > 0 \longrightarrow \left.\begin{aligned} |\Delta p^S| &= \frac{dt}{b+d} \\ |\Delta p^d| &= \frac{bt}{b+d} \end{aligned}\right\} = t$$

$$\left|\frac{\Delta p^S}{\Delta t}\right| = \frac{d}{b+d} = \frac{\varepsilon^d}{\varepsilon^d+\varepsilon^S}$$

$$\left|\frac{\Delta p^d}{\Delta t}\right| = \frac{b}{b+d} = \frac{\varepsilon^S}{\varepsilon^S+\varepsilon^d}$$

$\therefore$ for buyers $\varepsilon^d \uparrow \longrightarrow$ burden fell, $\varepsilon^d \downarrow \longrightarrow$ burden rise

$\therefore$ for sellers $\varepsilon^S \uparrow \longrightarrow$ burden fell, $\varepsilon^d \downarrow \longrightarrow$ burden rise //

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- Calculate the tax rate that maximizes the tax revenue of government.

$$T = tQ$$

$$T = t \cdot \left(\frac{a-c}{b+d} - \frac{t}{b+d}\right)$$

$$T(t) = \left(\frac{a-c}{b+d}\right)t - \frac{t^2}{b+d}$$

$$T'(t) = \frac{-\left(\frac{a-c}{b+d}\right)}{2\left(-\frac{1}{b+d}\right)}$$

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

$$\therefore \text{tax rate} = \frac{a-c}{2} \quad //$$

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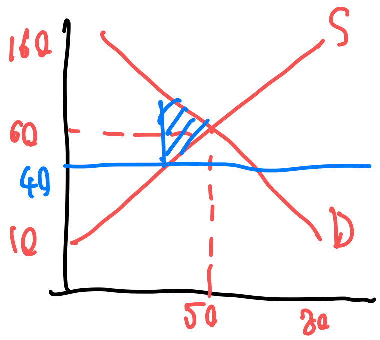
<u>Example 3.K</u> ***Price control and Welfare***

Consider the market for apartment rentals in Chicago. The price of rent is determined by the following system of equations.

Demand: $p = -2q_d + 160$

Supply: $p = q_s + 10$

- What is the equilibrium price and quantity in the market for apartment rentals?



$q^d = q^s = q^*$

$-2q^* + 160 = q^* + 10$

$150 = 3q^*$

$\therefore\ q^* = 50$ units, $P = 60$ //

- Suppose the government tries to control the rent prices through a price ceiling of \$40. Discuss the implication of this policy. Is there any deadweight loss?

Ceiling = 40

Demand ; $40 = -2q^d + 160$ $\quad q^d = 60$

Supply ; $40 = q_s + 10$ $\quad q_s = 30$

$\therefore$ implication of this policy will generate an excess demand and ther will be a DWL as well //

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