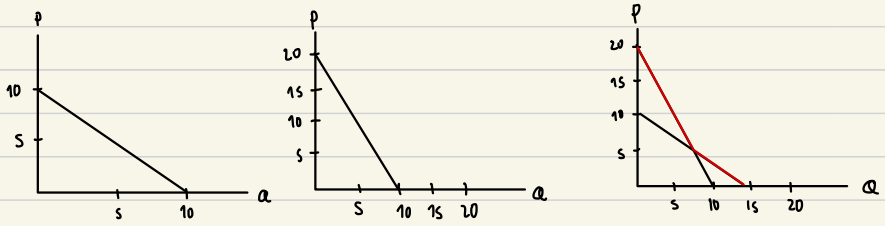
① 2 consumers 1 seller

A: $Q_A = 10 - P \rightarrow P = 10 - Q$ $Q = P$

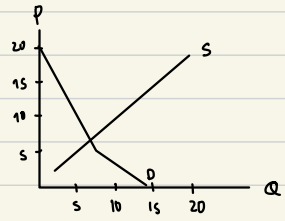
B. $Q_B = 10 - \frac{1}{2}P \rightarrow P = 20 - 2Q$

1.1 draw individual demand and market demand diagram



A B mrk

1.2 find equilibrium and how many buyer there are.



→ there are 1 buyer in the market.

$$Q^D_{mkt} \begin{cases} 10 - \frac{1}{2}P \; ; \; P > 10 \\ 20 - \frac{1}{2}P \; ; \; P \leq 10 \end{cases}$$

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

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

Supply : $p^s = c + dQ^s \quad ; \ d \geq 0.$ → $p^s = c + d\,Q^s + t$

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

$Q^d = \frac{a-p}{b}$

$Q^s = \frac{p-c-t}{d}$

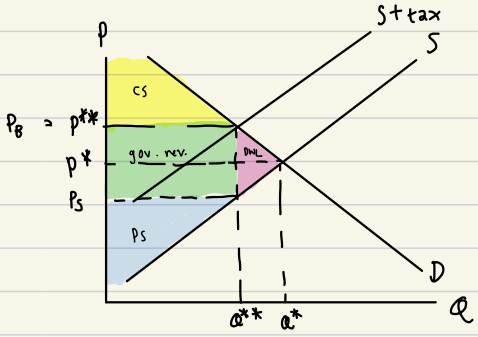
eqbm : $p^s = p^d$

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

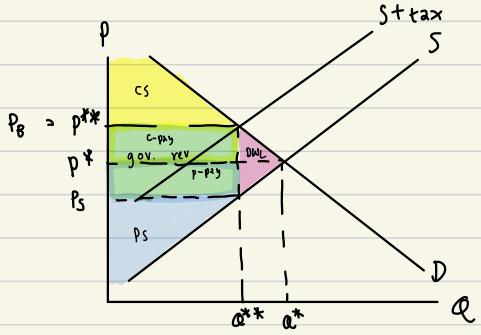
$Q(d+b) = a - c - t$

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

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



- Derive the excess burden formula for buyers and sellers



Before tax : consumers buy at p^*, which is cheap. While seller can sell at high price (p^*)

After tax : consumers buy at higher Price at p^{**} (P_B), and producer will receive less at P_S

extra price that consumers pay is $= (P_B - p^*) \times Q^{**}$

extra price that producers pay is $= (P_S - p^*) \times Q^{**}$

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

$\frac{\partial \text{ tax.rev.}}{\partial T} = \left(\frac{a-c-t}{d+b}\right) \times t$

$= at - ct - t^2 + dt + bt$

$0 = a - c - 2t - d - b$

$2t = a - c - d - b$

$t = \frac{a-c-d-b}{2}$

Example 3.K ***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?

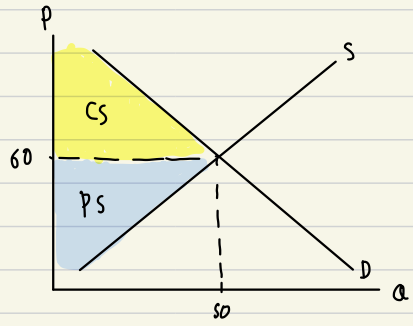
eqbm : $p^s = p^d$

$Q^s + 10 = -2Q^d + 160$

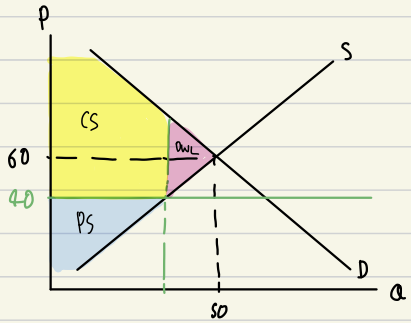
$3Q = 150$

$Q = 50$

$P = 60$



- 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?



the policy is annouce to reduce the quantity of renting an apartment. By having a cheaper price people will demand more of apartment, while the owner of the apartment does not want to rent their room out. The pink area is the dead weight loss