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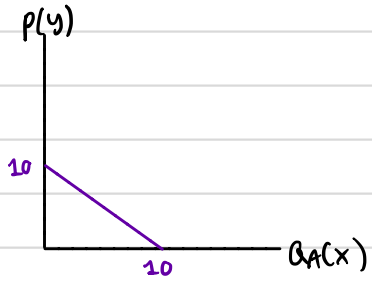
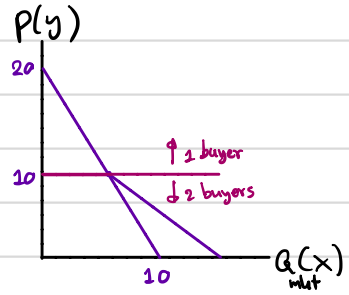
① $P \geq 10;\ Q_A = 0,\ Q_B = 10 - \frac{1}{2}P \rightarrow Q_{mkt} = 10 - \frac{1}{2}P$

$P < 10;\ Q_A = 10 - P,\ Q_B = 10 - \frac{1}{2}P \rightarrow Q_{mkt} = Q_A + Q_B = 20 - \frac{3}{2}P$



$P = 10 - Q_A$

$P = 20 - 2Q_B$



$Q^D_{mkt} = \begin{cases} 10 - \frac{1}{2}P & \text{for } P \geq 10 \\ 20 - \frac{3}{2}P & \text{for } P < 10 \end{cases}$

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② 3.J)

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

Tax per unit = t

Before tax: $P^* = f(a,b,c,d)$, $Q^* = f(a,b,c,d)$

$P^d = P^s$

$a - bQ^* = c + dQ^*$

$a - c = dQ^* + bQ^*$

$a - c = Q^*(b+d)$

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

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

$P^* = \frac{(a-b)(a-c)}{b+d} = \frac{(c+d)(a-c)}{b+d}$

After tax: $P^*_{tax} = f(a,b,c,d,t)$, $Q^*_{tax} = f(a,b,c,d,t)$

$a - bQ^* = c + dQ^* + t$

$a - c - t = bQ^* + dQ^*$

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

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

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

- Derive the excess burden formula for buyers and sellers

consumers' burden $= (P_B - P^*) \times Q_{tax}$

Producers' burden $= (P^* - P_S) \times Q_{tax}$

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

tax revenue $= t \times Q_{tax}$

$\frac{\partial \text{tax revenue}}{\partial t} = 0 \rightarrow t^*$

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(3) 3.K)

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

$P^d = P^s$

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

$3q^* = 150$

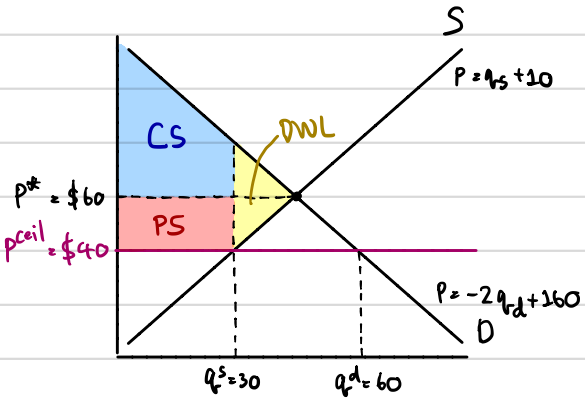
$q^* = 50$

$P^s = q_s + 10$

$= 50 + 10$

$P^* = 60$ #

- 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?



If price ceiling = $40

$P = q_s + 10 \rightarrow q_s = 40 - 10 = 30$

$P = 2q_d + 160 \rightarrow q_d = \frac{40-160}{-2}$

$= 60$

The price will decrease and makes producers produce less. So, the consumers want to consume more but not able to because of limited supply. Therefore, there will be deadweight loss