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

2 consumers

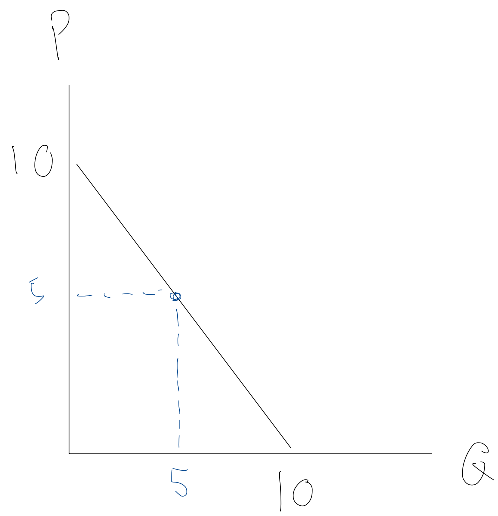
$A: Q_A = 10 - P$

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

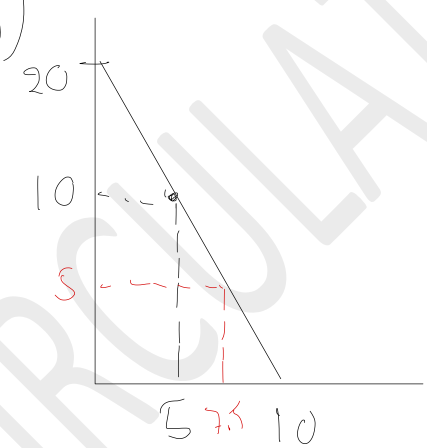
1 seller

$Q = P$

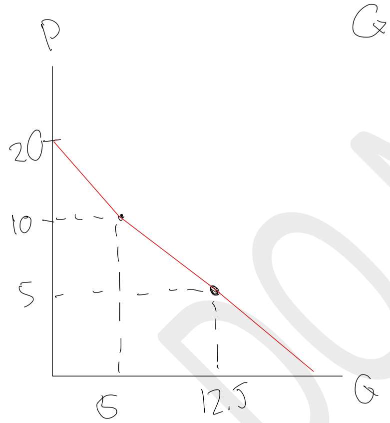
A)



B)

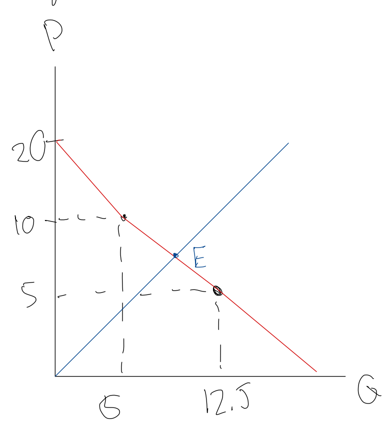


Market demand



$$Q_{mkt} \begin{cases} 10 - P \; ; \; P > 10 \\ 20 - \frac{3}{2} \; ; \; P \leq 10 \end{cases}$$

Equilibrium



Equilibrium

$Q = 20 \frac{3}{2} Q$

$\frac{2Q + 3Q}{2} = 20$

$5Q = 40$

$Q = 8$

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

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

EQ : $P_d = P_s$

pre tax

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

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

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

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

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

Post tax

$c + dQ + t$

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

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

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

- Derive the excess burden formula for buyers and sellers

$P^*_{tax} = P_B$

$$(P_B - P^*)\,Q_{tax}$$

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

$$P_s = c + d\left(Q^*_{tax}\right)$$

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

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

$$\text{tax revenue} = t \cdot Q_{tax}$$

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

$$= \frac{ta}{d+b} - \frac{tc}{d+b} - \frac{t^2}{d+b}$$

$$\frac{d\,\text{tax revenue}}{dt} = \frac{a}{d+b} - \frac{c}{d+b} - \frac{2t}{d+b}$$

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.

$150 = 3Q$

Demand: $p = -2q_d + 160$

Supply: $p = q_s + 10$

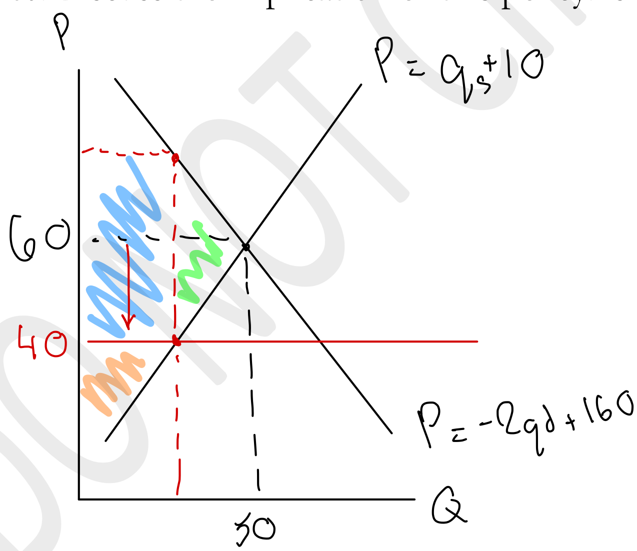
$-2q + 160 = Q + 10$ $\quad Q^* = 50$

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

$p^* = 50 + 10$

$p^* = 60$

- 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?



Less output at p = 40 than P = 60, Consumer surplus increases, Producer surplus decrease.

DWL exist