

Econ 100A: Intermediate Microeconomics
Problem Set 5
Solutions

Q.1.

$$MC(q) = 2q$$
$$p = 60 - 2q$$

a) Perfect Competition: A firm's profit max condition is given by $MC = MR$. In the case of perfect competition, the MR is just equal to the price. Therefore, we get:

$$\text{at profit max: } MC = p$$

$$\text{or, } 60 - 2q = 2q$$

$$60 = 4q$$

$$15 = q^*$$

Substitute this into the demand function to get p^* :

$$p^* = 60 - 2(15)$$

$$p^* = 30$$

$$\text{b) Consumer Surplus} = (60 - 30) \cdot 15 \cdot \frac{1}{2} = 225$$

$$\text{Producer Surplus} = 30 \cdot 15 \cdot \frac{1}{2} = 225$$

c) To get the equilibrium p and q for monopoly, set the $MC = MR$. We can get MR as the derivative of TR:

$$TR = p \cdot q$$

$$TR = 60q - 2q^2$$

$$MR = 60 - 4q$$

Therefore, at equilibrium:

$$60 - 4q = 2q$$

$$60 = 6q$$

$$10 = q^*$$

Substitute this into the demand function to get p^* :

$$p^* = 60 - 2(10)$$

$$p^* = 40$$

$$\text{d) Consumer Surplus} = (60 - 40) \cdot 10 \cdot \frac{1}{2} = 100$$

$$\text{Producer Surplus} = (20 \times 10) + (20 \times 10) \cdot \frac{1}{2} = 300$$

$$\text{Deadweight Loss} = (\text{Producer Surplus} + \text{Consumer Surplus in Perfect Competition}) - (\text{Producer Surplus} + \text{Consumer Surplus in Monopoly})$$
$$= 225 + 225 - 100 - 300 = 50$$

e) See graphs page

f) We know that:

$$\epsilon = \frac{dq}{dp} \cdot \frac{p}{q}$$

We can get the value of $\frac{dq}{dp}$ from the inverse demand function:

$$p = 60 - 2q$$

$$q = 30 - \frac{1}{2}p$$

$$\frac{dq}{dp} = -\frac{1}{2}$$

Substitute this, and the equilibrium values of p and q into the formula for elasticity:

$$\epsilon = -\frac{1}{2} \cdot \frac{40}{10}$$

$$\epsilon = -2$$

A monopolist firm's markup over price can be calculated as:

$$p = \left(\frac{1}{1-|\frac{1}{\epsilon}|}\right) \cdot MC$$

$$p = \left(\frac{1}{1-|\frac{1}{-2}|}\right) \cdot MC$$

$$p = \left(\frac{1}{\frac{1}{2}}\right) \cdot MC$$

$$p = 2 \cdot MC$$

Therefore, the markup of price over marginal cost is given by 2.

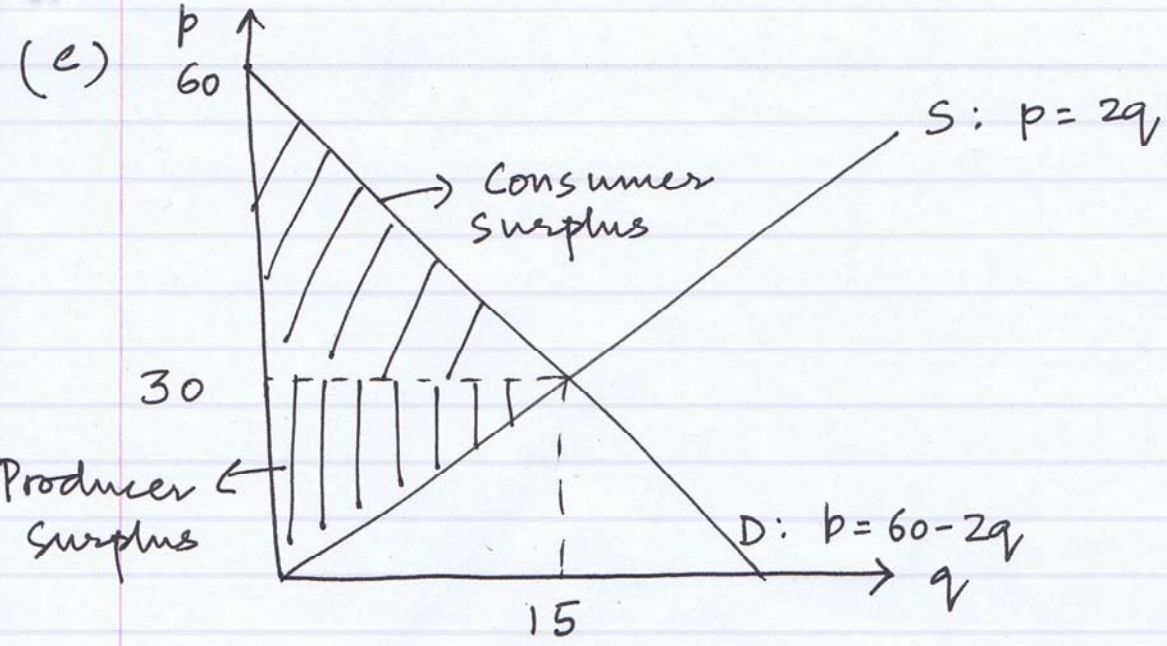
Q.2.

a) Payoff Matrix:

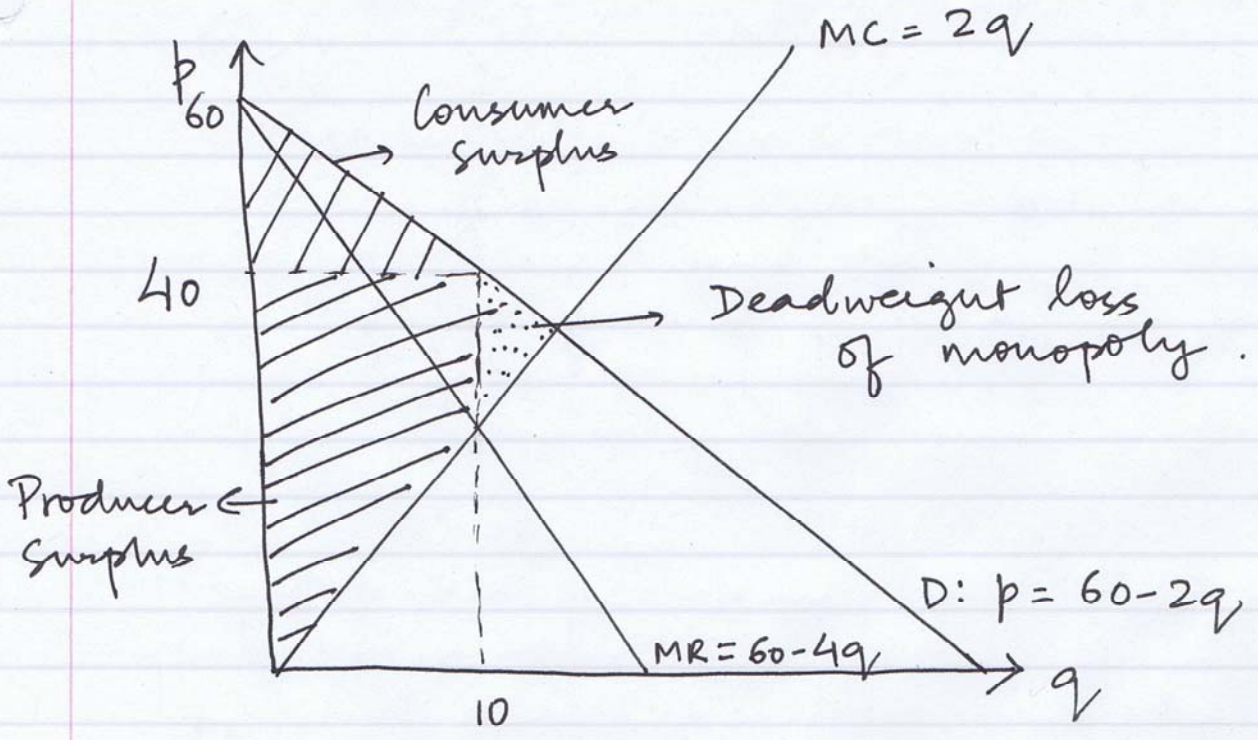
		Boeing	
		<i>produce</i>	<i>not produce</i>
Airbus	<i>produce</i>	-250, -250	<u>750, -100</u>
	<i>not produce</i>	<u>-25, 400</u>	0, 0

Therefore, there are 2 nash equilibria, given by: {produce, not produce} & {not produce, produce}

b) & c) See graphs page.

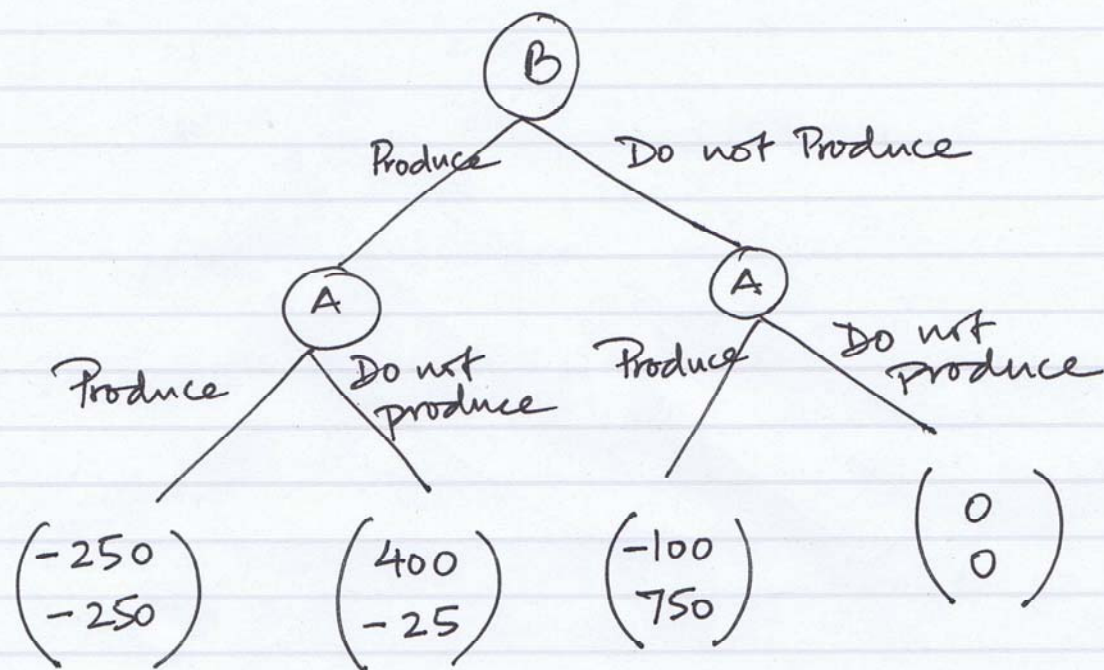


Producer & Consumer Surplus in Perfect Competition



8.2

(b) Sequential Game.



If Boeing chooses to produce, then Airbus chooses not to. If Boeing chooses not to produce, then Airbus chooses to produce. Since the pay-off for Boeing is higher if it produces (and Airbus chooses not to), it will choose to produce.
 \therefore the equilibrium of this game is $\{ \text{produce, don't produce} \}$

(c) If ~~Boeing~~ Airbus pre-commits to produce, then Boeing knows that its eventual pay-off is either going to be -250 (when it produces) or -100 (if it doesn't). Since $-100 > -250$, Boeing will choose to not produce.
 \therefore Equilibrium $\{ \text{Do not produce, Produce} \}$.