

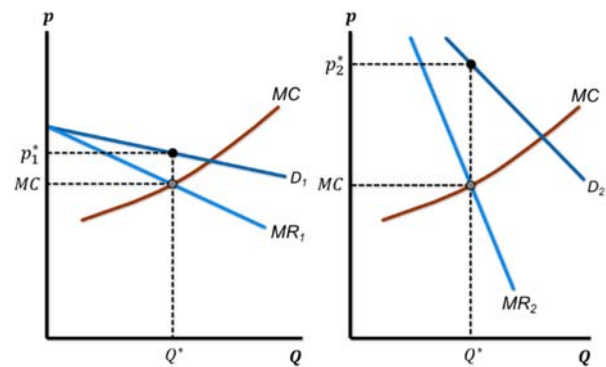
## Practice Set 4 – KEY

### Monopoly & Market Efficiency

This set contains problems for your own practice. It is highly recommended to work on the problems on your own. Do not just read the provided solutions. Instead, try to solve the problems and use the solutions only when you cannot continue on your own. Reading problems that someone else has solved has the same value for your preparation like watching someone else running a marathon on TV and then expecting to be able to run it, too. If you have questions on this set, please ask your section's teaching assistant.

1. Explain how market power increases with the slope of the demand curve the firm is facing.

When the demand is horizontal (slope is zero), price equals MC, thus, market power is zero. When the demand is downward sloping but relatively elastic (small slope of  $D_1$  in the left figure), the  $MC = MR$  equality occurs below the demand curve and the distance between  $p$  and  $MC$  shows the existence of market power. As the demand's slope increases (right figure), the  $MC = MR$  equality is located further below the demand curve and the distance between  $p$  and  $MC$  increases, showing the increase in market power.



2. Explain whether the “same intercept – double slope” rule for the MR works when you want to derive the MR for a PC firm.

In PC, the demand is perceived by the individual firm as a horizontal line. That is, its slope is zero. The “same intercept – double slope” method in this case would yield an MR curve with slope  $2 \cdot 0 = 0$  and the same intercept with the demand. In other words, a horizontal demand and its MR curve would coincide, which is indeed the case in PC. The “same intercept – double slope” method works for every linear demand curve and for any market.

3. Explain how lobbying can increase the social cost of monopolies if it is used for rent-seeking.

Lobbying money goes to support politicians who will arrange for monopoly rights in exchange. Resources spent on lobbying are not used to make production more efficient and often exceed the DWL.

4. Explain how advertisement can increase the social cost of monopolies if it is used for rent-seeking.

In many monopolistic markets, resources spent on advertisement aim to change the industry standards by increasing advertisement requirements (for example consumers are more inclined to only buy products which are frequently advertised with high-quality advertisements). That is, advertisement is intended for the creation of barriers for potential entrants who do not have abundance of funds for advertisement, not for informing the consumers.

5. Explain how building excess capacity can increase the social cost of monopolies if it is used for rent-seeking.

Monopolies invest in equipment which is not intended to be used in production. Instead, the excess capacity serves as a threat: “If you enter my territory, I will use my scale to increase production, flood the market and drop the price lower than your AC”.

6. Katerina is the only seller of lemonade in the nationhood. The demand for lemonade is  $p = 30 - 2q$ , where  $q$  are glasses of lemonade and  $p$  is the price per glass. Her marginal cost is  $MC = q$  and her fixed cost is 2.

(a) Make a table with Katerina's  $FC$ ,  $MC$ ,  $AC$ ,  $TC$ ,  $p$  and profit from 1 to 15 glasses of lemonade.

$q$	$FC$	$MC$	$AC$	$TC$	$p$	Profit
1	2	1	3	3	28	25
2	2	2	2.5	5	26	47
3	2	3	2.67	8	24	64
4	2	4	3	12	22	76
5	2	5	3.4	17	20	83
6	2	6	3.83	23	18	<b>85</b>
7	2	7	4.29	30	16	82
8	2	8	4.75	38	14	74
9	2	9	5.22	47	12	61
10	2	10	5.7	57	10	43
11	2	11	6.18	68	8	20
12	2	12	6.67	80	6	-8
13	2	13	7.15	93	4	-41
14	2	14	7.64	107	2	-79
15	2	15	8.13	122	0	-122

(b) How many glasses of lemonade should Katerina produce to maximize her profit?

*Katerina's marginal revenue will be:  $MR = 30 - 4q$ . Profit maximization will occur when  $MR = MC$  or  $30 - 4q = q$  or  $q = 6$ .*

(c) How much should Katerina charge per glass in order to maximize her profit?

*We must plug  $q = 6$  in the demand function to see how much would consumers be willing to pay for a total of 6 glasses. That is  $p = 30 - 2 \cdot 6$  or  $p = 18$ .*

(d) How much is the maximum profit that Katerina will make?

*Katerina's profit for  $q = 6$  will be  $\Pi = p \cdot q - TC$  or  $\Pi = 18 \cdot 6 - 23$  or  $\Pi = 85$ .*

(e) How many whole glasses of lemonade would Katerina produce if she acted as a PC firm?

*If Katerina acted as a PC firm, maximization of profit would occur when  $p = MC$  or  $30 - 2q = q$  or  $q = 30/3$  or  $q = 10$ .*

(f) How much would she charge if she acted as a PC firm?

*We must plug  $q = 10$  in the demand function to see how much would consumers be willing to pay for a total of 10 glasses. That is  $p = 30 - 2 \cdot 10$  or  $p = 10$ .*

(g) How much S-R profit would she make if she acted as a PC firm?

*Katerina's profit for  $q = 10$  will be  $\Pi = p \cdot q - TC$  or  $\Pi = 10 \cdot 10 - 57$  or  $\Pi = 43$ .*

7. A market faces demand  $p = 10 - 2Q$ , while the marginal cost is  $MC = 2$ .

(a) If this market is populated by a large number of identical firms, what will be the price and the total quantity?

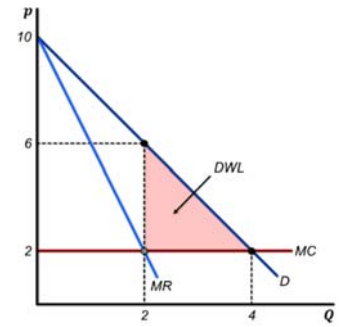
*If this market resembles a PC structure, the price will be equal to MC or  $p = 2$ . At  $p = 2$ , total quantity will be  $2 = 10 - 2Q$  or  $Q = 4$ .*

(b) If the market is exploited by a single firm, at what price will this firm be selling?

*Marginal revenue will be  $MR = 10 - 4Q$ .  $MR = MC$  implies  $10 - 4Q = 2$  or  $Q = 2$ . Such quantity will be absorbed by the market at a price given by the demand  $p = 10 - 2 \cdot 2$  or  $p = 6$ .*

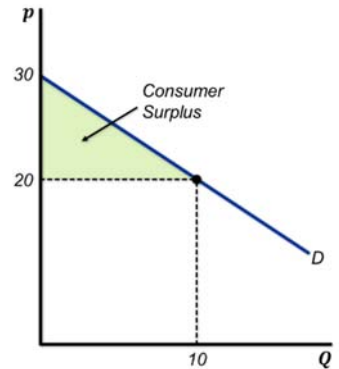
(c) Calculate the DWL when the market is exploited by a single firm.

The height of the DWL will be from the monopoly price (6) to the MC (2). That is, height =  $6 - 2 = 4$ . The base of the DWL will be from the monopoly quantity (2) to the PC quantity (4). That is, base =  $4 - 2 = 2$ . Thus, the DWL =  $4 \cdot 2 \cdot 0.5 = 4$ .



8. You are given the demand curve  $p = 30 - q$ . Price is equal to 20. Calculate the consumer surplus.

We plug  $p = 20$  in the demand curve to calculate the quantity:  $20 = 30 - q$  or  $q = 10$ . This means that consumer surplus will be a triangle with base 10. The height of the triangle will be from the intercept of demand (30) to the price (20) or  $30 - 20 = 10$ . Thus,  $CS = 0.5 \cdot 10 \cdot 10 = 50$ .



9. Consider the market of a PC good with a vertical market demand.

(a) Explain the economic meaning of a vertical demand curve.

A vertical demand curve (completely inelastic) means that the consumers will buy the given same quantity of the good no matter what the price is. In reality, such demand curves are exhibited by consumers for strict necessities (surgery, insulin, chemo, etc.) or products that are a small part of the household budget (salt, water, pepper etc.).

(b) A tax per unit is imposed on the good. Explain who will end up paying the burden of the tax.

The tax will shift the supply upwards by the value of the tax. Since the demand is vertical, the after-tax equilibrium quantity will remain the same and the after-tax equilibrium price will increase as much as the tax (see figure 3). This means that the consumer will end up undertaking the entire burden of the tax.

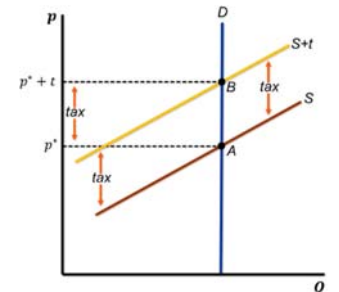


Figure 3

10. Calculate the sum  $1 + 2 + 3 + \dots + 98 + 99 + 100$ .

This summation has 100 terms and will take too long to type it to a calculator. Yet, there is a neat shortcut to compute it fast. Observe that the first term (1) and the last term (100) sum up to 101. Then, the second (2) and the second-to-last term (99) also sum up to 101. The third (3) and the third-to-last (98) again sum up to 101 and this keeps happening as we move inwards pairing the terms of the summation. Since we have 100 total terms, it is as if we have 50 pairs of terms that all sum up to 101. Thus, the sum should be equal to  $50 \cdot 101 = 5,050$ .

You are kindly requested to report any typos, mistakes or proposals for the improvement of this practice set key at [kmarinakis@smu.edu.sg](mailto:kmarinakis@smu.edu.sg).