

Question 1:

Suppose that the demand curve derived from marginal benefit associated with a consumption of chocolate is $360 - 4Q$ and the marginal cost of chocolate production is $6Q$. The marginal damage from pollutions generated by chocolate production is $2Q$.

- Find the social optimum or efficient production level (P^* , Q^*)
- Find the private equilibrium price and quantity when external costs could be ignored by firms
- What tax level should be set to achieve the efficient/social optimal
- Calculate deadweight loss from externalities in this case
- Drawing a graph to illustrate the result from a) to d)

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a) $P = MC_S$

$$360 - 4Q = 8Q$$

$$12Q = 360$$

$$Q^* = 30$$

$$P^* = 360 - 4(30)$$

$$= 240$$

$$P^* = 240, Q^* = 30$$

b) $P = MC_P$

$$360 - 4Q = 6Q$$

$$10Q = 360$$

$$Q_m = 36$$

$$P_m = 360 - 4(36)$$

$$= 360 - 144$$

$$= 216$$

$$P_m = 216, Q = 36$$

c) tax level = pollution cost

$$\text{Pollution cost} = 2Q$$

$$= 2(30)$$

$$= 60$$

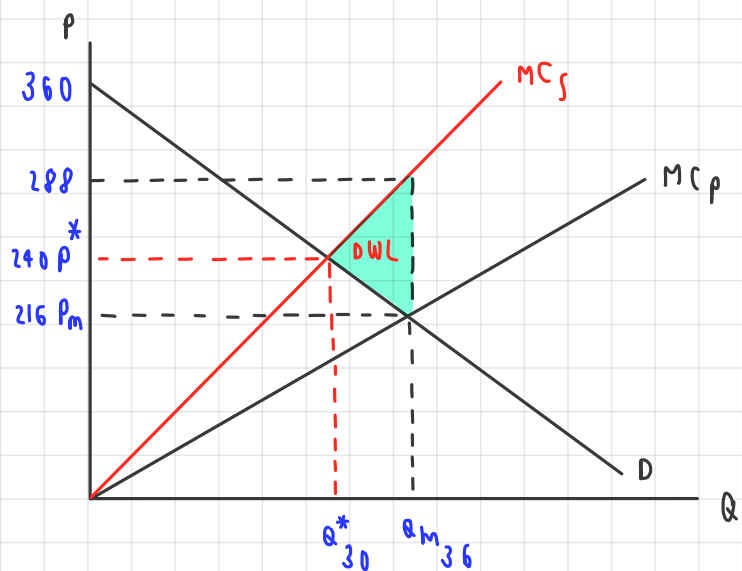
d) $DWL = \frac{1}{2} \times b \times h$

$$= \frac{1}{2} \times (36 - 30) \times (240 - 216)$$

$$= \frac{1}{2} \times 6 \times 24$$

$$= 72$$

e)



Question 2:

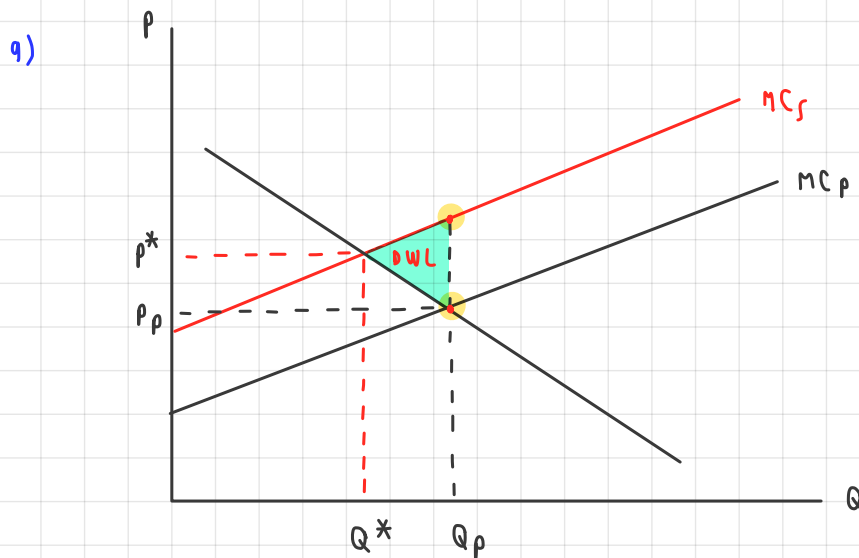
The production of cigarettes increases water pollutions while the consumption of cigarettes can put their neighbors at health risks (Hint: Impact on social marginal benefits as a whole)

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- a) Explain how externalities in this case create inefficiencies in the cigarette market and draw a graph to illustrate your explanation, including the market equilibrium for cigarettes at i) socially optimal level, P^* and Q^* ; ii) private optimal level (P_p and Q_p) when externalities are not internalized by both firms and consumers and; iii) the deadweight loss area.
- b) What policies could be considered to reduce deadweight loss in this case and describe the effects of such policies in the cigarette market.

(negative production externality)
production $\uparrow$ water pollutions, consumption $\uparrow$ health risks



externalities create inefficiencies as the firm would maximize its profits if it produces at (Q_p, P_p) , but producing at this point the firm will cause the social cost to increase as more pollutions are released. (more cost to society). Therefore, the firm should produce at (Q^*, P^*) to protect the social welfare and reduce the deadweight loss.

b) the policies that may reduce deadweight loss could be :

- 1) imposing tax on consumer, when the government imposes tax on consumer, the consumer price will increase leading the consumer to consume less and causing MB to shift downward. Hence, DWL will be reduced as price increases
- 2) establishing regulations to reduce the demand for cigarette such as establishing area prohibiting the sales of cigarettes along the river to reduce water pollution. This will cause the consumer's consumption to shift left from Q_p to Q^* . So DWL will be reduced as a result of the decrease in consumer's demand.
- 3) reducing consumer's consumption by informing consumer about the negative impacts of cigarettes on both environment and consumer's health