

1. A human civilization finds a new wood source of total 120 units. Wood can either be used to produce spear or bow for hunting. A wood master then calculates that in order to produce a spear, it takes 4 units of wood while 3 units for a bow. Answer the following questions.

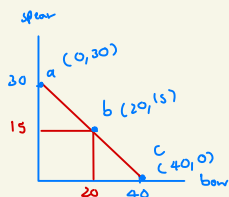
1.a) Assumed that the opportunity cost of using this 120 units of wood to produce the products is constant, draw a production possibility curve (PPC), displaying quantity of spear on the vertical axis and quantity of bow on the horizontal axis, and indicate all the essential details in the graph and explain.

1.b) How much is the opportunity cost for a spear, in terms of bow? Show how you calculate this figure.

1.c) With this newly found resource, is it possible for this civilization to produce 20 spears and 12 bows? If it is, is this option efficient? Display this option on a graph from (a) and explain.

1.d) If a new method of making bow is discovered and requires only 1.5 units of wood for each bow, how does it affect the PPC and the opportunity cost for a spear? Illustrate the change and explain.

1.a)



$$\frac{120}{4} = 30 \text{ spears}$$

$$\frac{120}{3} = 40 \text{ bows}$$

point b $\rightarrow$ c: spear decrease 15
bow increase 20
point b $\rightarrow$ a: spear increase 15
bow decrease 20

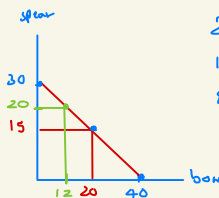
1.b)

opportunity cost for 15 spear is 20 bow

opportunity cost for 1 spear is $\frac{20}{15}$ bow

opportunity cost for 1 spear is 1.33.. bow

1.c)



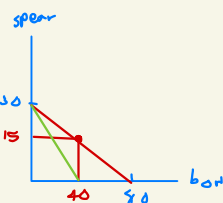
$$20 \times 4 = 80 \text{ spears}$$

$$12 \times 3 = 36 \text{ bows}$$

$$80 + 36 = 116 \text{ units of wood}$$

It is possible because this method use 116 of 120 units of wood but it not efficiency because there is units of wood left.

1.d)



$$\frac{120}{4} = 30 \text{ spears}$$

$$\frac{120}{1.5} = 80 \text{ bows}$$

opportunity cost for 15 spear is 40 bow

opportunity cost for 1 spear is $\frac{40}{15}$ bow

opportunity cost for 1 spear is 2.66.. bow

PPC will become flatter and

opportunity cost of spear will increase from 1.33 to 2.66 bow per spear

2. Few years ago, the MRT Purple Line electrical train opened to the public but with unexpected low ridership, the operator of MRT decided to lower the fare from 42 to 29 baht per trip. As a result, the number of passengers increased from 20,000 to 21,000 commuters.

2.a) What is the price elasticity of demand for MRT Purple Line? Show your work.

2.b) If the MRT operator decides to reduce the fare even further from 29 to 15 baht per trip. Do you think this price-reduction strategy will help increasing total revenue of MRT Purple Line? Give a clear explanation with support of a diagram.

$$\begin{aligned}
 2.a) \quad \frac{P}{Q} \cdot \frac{Q_2 - Q_1}{P_2 - P_1} &= \frac{42}{20000} \cdot \frac{21000 - 20000}{29 - 42} \\
 &= \frac{42}{20000} \cdot \frac{1000}{-13} \\
 &= -\frac{21}{130} \\
 &= -\frac{0.1615}{1} = \frac{\% \Delta Q_d}{\% \Delta P} \rightarrow \text{when price } \downarrow 1\%, \\
 &\quad Q_d \uparrow 0.1615\%
 \end{aligned}$$

2.b) $TR = P \cdot Q$

$$\epsilon_d = \frac{P}{Q_1} \cdot \frac{Q_2 - Q_1}{P_2 - P_1} \rightarrow \frac{29}{21000} \cdot \frac{Q_2 - 21000}{15 - 29} = -\frac{21}{130}$$

$$\frac{29(Q_2) - 609000}{-294000} = -\frac{21}{130}$$

$$29(Q_2) - 609000 = \frac{617400}{13}$$

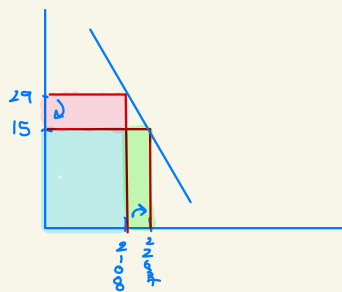
$$29(Q_2) = 656492.3077$$

$$Q_2 = 22637.66578$$

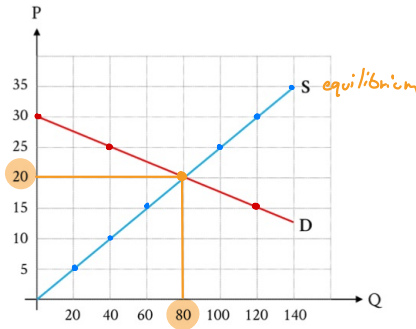
$$\begin{aligned}
 &\rightarrow 29 \cdot 21000 \\
 &= 609000
 \end{aligned}$$

$$\begin{aligned}
 &\rightarrow 15 \cdot 22637.66578 \\
 &= 339564.9867
 \end{aligned}$$

I think that the price-reduction strategy will not help increasing total revenue and total revenue is also decrease making inelastic demand



3. Assumed that a headphones market is perfectly competitive, demand and supply for headphones are illustrated in the graph below. Answer the following questions.



3.a) Calculate price elasticity of demand and price elasticity of supply at the equilibrium price.

3.b) Calculate both consumer and producer surplus at the socially optimum price and quantity.

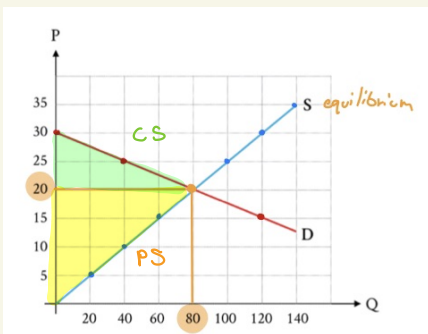
3.c) Now supposed that all the producers collude and become a monopoly, they can charge the price at \$25. Consequently, total quantity in this headphones market becomes 40 pairs. Discuss the change in both consumer surplus and producer surplus.

3.d) Is there any deadweight loss due to the collusion? If there is, how much is it?

$$3.a) \epsilon_d = \frac{P_1}{Q_1} \cdot \frac{Q_2 - Q_1}{P_2 - P_1} = \frac{25}{40} \cdot \frac{80 - 40}{20 - 25} = \frac{25}{40} \cdot \frac{40}{-5} = \frac{-5}{1} = \frac{\% \Delta Q_d}{\% \Delta P}$$

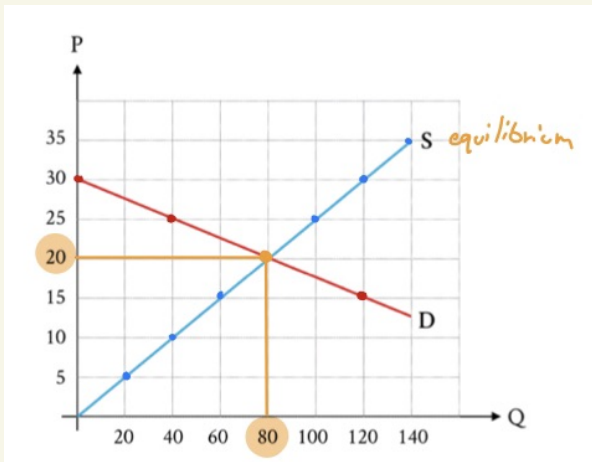
$$\epsilon_s = \frac{P_1}{Q_1} \cdot \frac{Q_2 - Q_1}{P_2 - P_1} = \frac{15}{60} \cdot \frac{80 - 60}{20 - 15} = \frac{15}{60} \cdot \frac{20}{5} = \frac{1}{1} = \frac{\% \Delta Q_s}{\% \Delta P}$$

3.b)



$$CS = \frac{1}{2} \times 10 \times 80 = 400$$

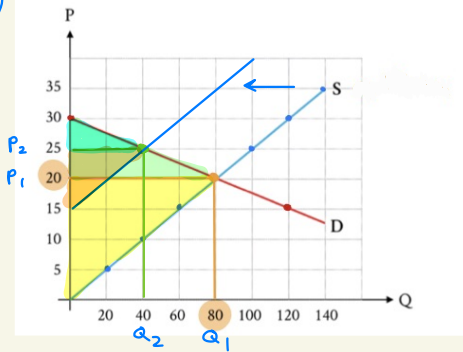
$$PS = \frac{1}{2} \times 20 \times 80 = 800$$



3.c) Now suppose that all the producers collude and become a monopoly, they can charge the price at \$25. Consequently, total quantity in this headphones market becomes 40 pairs. Discuss the change in both consumer surplus and producer surplus.

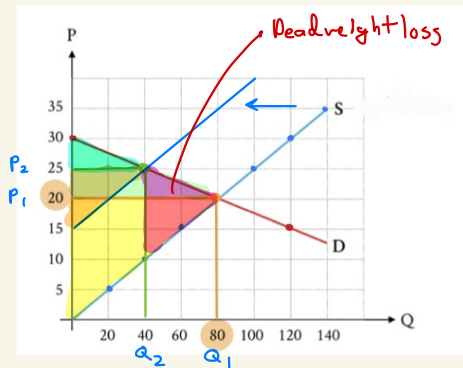
3.d) Is there any deadweight loss due to the collusion? If there is, how much is it?

3.c)



Price $\uparrow$
 producer $\downarrow$
 producer surplus smaller
 consumer surplus smaller

3.d)

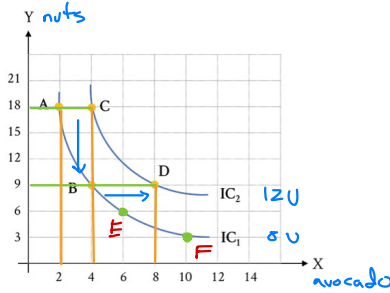


$$\left[\frac{1}{2} \times 5 \times 40 \right] + \left[\frac{1}{2} \times 10 \times 40 \right]$$

$$= 100 + 200 = 300$$

There is Deadweight Loss

4. A consumer finds that for him/her avocado (X) and nuts (Y) are substitutes. Assumed that this consumer yields 8 and 12 utils on IC1 and IC2 respectively, show your work and answer the following questions.



4.a) Measured from point A to B, assumed P_y is 10 baht per unit, how much P_x must be to make you conclude that the consumer's equilibrium is on point B?

4.b) Measured from point A to B, assumed P_x is 180 baht per unit, how much budget does this consumer has to achieve the equilibrium on point B?

4.c) Measured from point C to point D, how much is the average marginal utility per unit of avocado?

4.d) Show that this consumer's utility received from consuming avocado is in accordance with the law of diminishing marginal utility, using any essential information from any point. (But highly recommend that you consider all the points)

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$$4.a) \left| \frac{\Delta y}{\Delta x} \right| = \frac{P_x}{P_y} ; A \text{ to } B$$

$$\left| \frac{y_B - y_A}{x_B - x_A} \right| = \frac{P_x}{P_y}$$

$$\left| \frac{9 - 18}{4 - 2} \right| = \frac{P_x}{10}$$

$$P_x = 45$$

4.d)

$$4.b) \frac{P_x}{P_y} = \left| \frac{\Delta y}{\Delta x} \right|$$

$$\frac{180}{P_y} = \frac{9}{2}$$

$$\frac{360}{9} = P_y$$

$$40 = P_y$$

$$I = P_x \cdot X + P_y \cdot Y$$

$$= 180(4) + 40(9)$$

$$= 720 + 360$$

$$= 1080$$

4.c)

$$\frac{MU_x}{MU_y} = \left| \frac{\Delta y}{\Delta x} \right|$$

$$= \left| \frac{y_D - y_C}{x_D - x_C} \right|$$

$$= \left| \frac{6 - 18}{8 - 4} \right|$$

$$\frac{P_x}{P_y} = \frac{9}{4}$$

$$= 2.25$$

$$\left| MRS_{xy}(B) \right| = \left| \frac{\Delta y}{\Delta x} \right|$$

$$= \left| \frac{9 - 18}{4 - 2} \right| = \left| \frac{-9}{2} \right| = 4.5$$

$$\left| MRS_{xy}(E) \right| = \left| \frac{\Delta y}{\Delta x} \right|$$

$$= \left| \frac{6 - 9}{8 - 4} \right| = \left| \frac{-3}{4} \right| = 0.75$$

$$\left| MRS_{xy}(F) \right| = \left| \frac{\Delta y}{\Delta x} \right|$$

$$= \left| \frac{3 - 6}{10 - 6} \right| = \left| \frac{-3}{4} \right| = 0.75$$

consumer's utility follows the law of diminishing of return

If consumer consume more
will get + less marginal utility