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.

perfectly substitutable

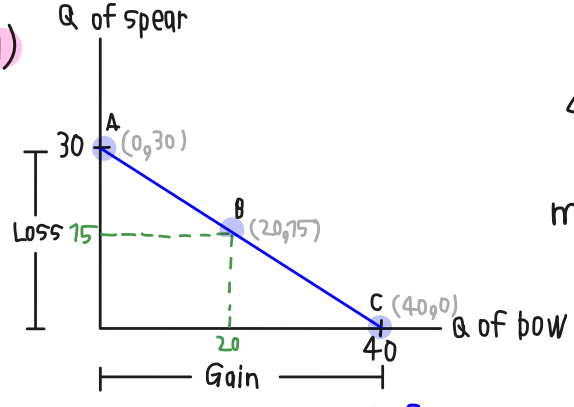
1.a) Assumed that the opportunity cost of using this 120 units of wood to produce the products is constant, draw a production possibility curve (PPC), displaying quantity of spear on the vertical axis and quantity of bow on the horizontal axis, and indicate all the essential details in the graph and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



$4S+3B=120$

$4S=120$ | $3B=120$

$S=30$ | $B=40$

moving from B → C

lose : 15 spares

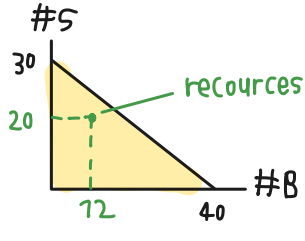
gain : 20 bows

1.b) The opportunity cost for a spear in terms of bow is 0.75

from point B: gain 15 spears = give up 20 bows

$\therefore$ 1 spear costs $\frac{20}{15} = 1.33$ bow

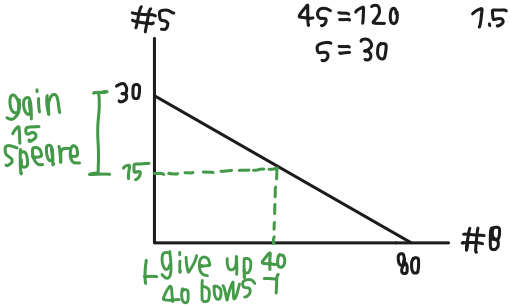
1.c) Producing 20 spears and 12 bows is possible but not efficient because it doesn't reach a maximum productivity, and there are wasted resources.



$4S+3B=120$

$4(20)+3(12)=116$

1.d) new method : $4S + 1.5B = 120$



$4S = 120$, $S = 30$; $1.5B = 120$, $B = 80$

1 spear costs $\frac{80}{30} = 2.667$ bow

The slope of PPC is flatter, and the opportunity cost increases from 1.33 to 2.67 in terms of bow, which means that gaining up the same amount of spear will lose more bows.

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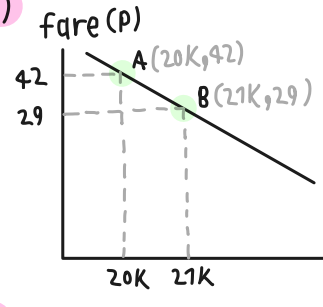
2. Few years ago, the MRT Purple Line electrical train opened to the public but with unexpected low ridership, the operator of MRT decided to lower the fare from 42 to 29 baht per trip. As a result, the number of passengers increased from 20,000 to 21,000 commuters.

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.

2.a)

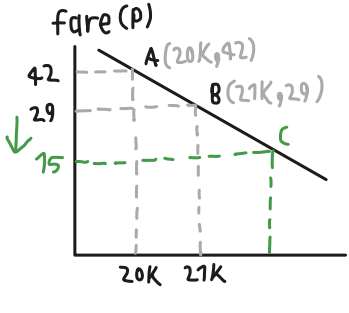


$$\varepsilon_d(AB) = \frac{P_2+P_1}{Q_2+Q_1} \times \left(\frac{Q_2-Q_1}{P_2-P_1}\right)$$

$$= \frac{29+42}{20K+21K}\left(\frac{1000}{13}\right) = \frac{71}{42K}\cdot\frac{1000}{13} = -\frac{0.13}{1}$$

price elasticity is -0.13, inelastic

2.b) Price-reduction strategy won't help increase total revenue due to the graph and formula below. It shows that if the price of inelastic product gets lower, total revenue is lower too.



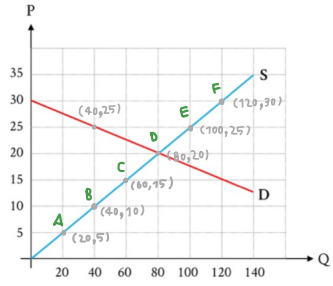
$$\frac{dTR}{dP} = Q(\varepsilon_d + 1) \qquad \varepsilon_d = -0.13$$

$$\therefore \frac{dTR}{dP} = Q(-0.13+1)$$

$$= 0.87Q$$

P↑ T↑
P↓ T↓

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)

$$\varepsilon_d = \frac{Q_2+Q_1}{P_2+P_1}\left(\frac{P_2-P_1}{Q_2-Q_1}\right)$$

$$= \frac{80+40}{20+25}\left(\frac{20-25}{80-40}\right)$$

$$= \frac{120}{45}\left(\frac{-5}{40}\right)$$

$$\varepsilon_d = -0.33$$

$$\varepsilon_s = \frac{P}{Q} \times \frac{Q_2-Q_1}{P_2-P_1}$$

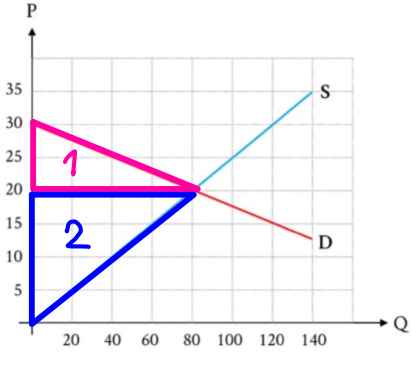
$$\varepsilon_{s(A)} = \frac{20}{5}\left(\frac{5-10}{20-40}\right) = 1 \quad (0.25)$$

$$\varepsilon_{s(B)} = \frac{40}{10}(0.25) = 1$$

$$\varepsilon_{s(C)} = \frac{60}{15}(0.25) = 1$$

$\varepsilon_s = 1$ because the intercept is at (0,0)

3.b)



① is consumer surplus

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

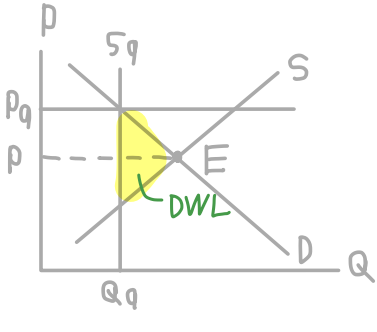
② is producer surplus

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

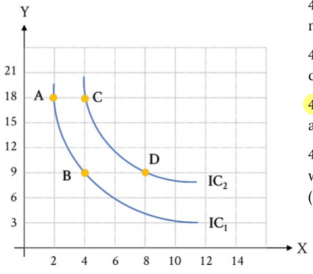
$\therefore$ CS = 400

PS = 800

3.c) Due to the collusion, there is a deadweight loss when the market doesn't archieve equilibrium or when the government impose "acreage limitation program".



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.



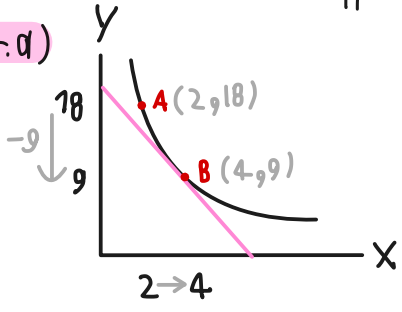
4.a) Measured from point A to B, assumed Py is 10 baht per unit, how much Px must be to make you conclude that the consumer's equilibrium is on point B?

4.b) Measured from point A to B, assumed Px 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)

4.a)



if Consumer's equilibrium at B

Slope of IC = slope of BL

$$\left|\frac{\Delta Y}{\Delta X}\right| = \frac{P_X}{P_Y}$$

$$\frac{9}{2} = \frac{P_X}{10}$$

$$P_X = 45$$

4.b) budget

point B (4,9)

$$\left|\frac{\Delta Y}{\Delta X}\right| = \frac{P_X}{P_Y}$$

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

$$P_Y = 40$$

$$I = P_X \cdot X + P_Y \cdot Y$$

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

$$= 1{,}080$$

4.c) MU_{CD}

- point C (4,18), IC2 yield 12 utils
  consume avocado 4 units, nut 18 units
- point B (4,9), IC1 yield 8 utils
  consume avocado 4 units, nut 9 units

consumer have to consume 4 more units of avocado in order to yield 12 utils. 4 units of avocado = 4 utils

So, avocado 1 unit = $\frac{4}{4} = 1$ util

average MU per 1 unit of avocado = ① #

4.d) $MRS = \frac{\Delta Y}{\Delta X}$

At point A, C is upper-left of the graph

$MRS = 0$ Consuming lots of $y \rightarrow MU_y$ low

few of $x \rightarrow MU_x$ high

At point B, D is lower-right of the graph

$MRS_B = \frac{-9}{2} = -4.5$ consuming lots of $x \rightarrow MU_x$ low

$MRS_D = \frac{-9}{4} = 2.25$ few of $y \rightarrow MU_y$ high