Assignment 1
Assigned on Feb 17th, 2022. To be submitted on Feb 26th, 2022 before midnight

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Instructions

(1) Please read the instruction carefully. Also take this habit with you into the exam room.
(2) Please read each question carefully and answer the questions straightforwardly. Always provide economic reasons at lease a paragraph for your analysis, or a graph when necessary, (even when the question does not indicate so.)
(3) Handing and submitting assignments are only available via BE Moodle.

Answering the questions and preparing answer sheets

(1) Answers are to be (handwritten,) in either (digital or analog form) in a blank canvas or any clean paper. Make sure that your handwriting is clearly visible and readable.
(2) There is no need to rewrite the question. Just indicate the question number clearly for each of the answer, such as 1.a).
(3) When done, for the digital case, collage all the pages into a single PDF file. For those who write on sheets of paper, take photo of all pages then convert all of them into a single PDF file as well.
(4) Name your PDF file as StudentID_YourNickname, such as 640123456_Bo.

Submitting your answers

(1) Make sure your file does not exceed 10MB. This is the maximum file size for BE Moodle upload.
(2) Login to BE Moodle, head into the course, then the assignment topic.
(3) Choose your file to submit. Done. There will be timestamp for your upload date and time, so please make sure to not submit later than that.

Spear : 4 units of woods
bow : 3 units of woods

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.

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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.

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.

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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.

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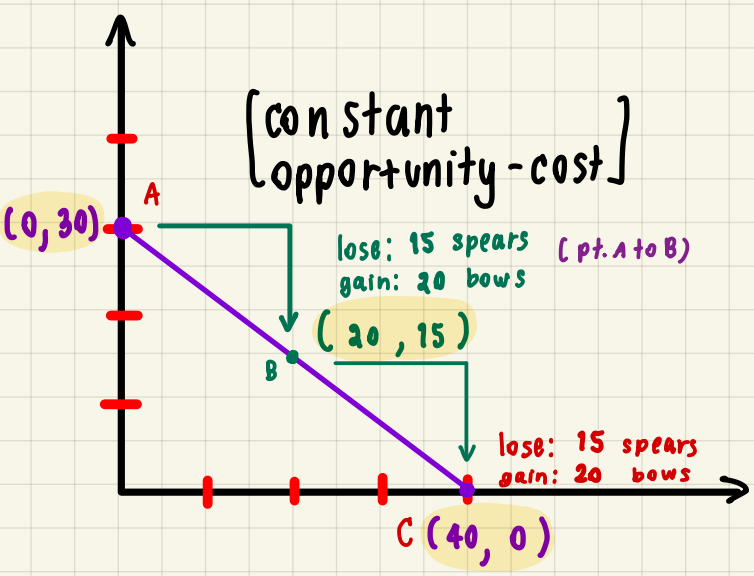
1)

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.

opportunity cost of using 120 units = constant → [So, a linear graph]

※no. of spear

(PPC) Production possibility curve



1 spear: 4 units of wood

1 bow: 3 units of wood

↳ The spear & bow are perfectly substituable

4 units x 30 spears = 120 total units (0, 30)

3 units x 40 bows = 120 total units (40, 0)

$\frac{(Y_2-Y_1)}{(X_2-X_1)} = \frac{0-30}{40-0} = \frac{-30}{40} = \boxed{\frac{-3}{4}}$

$\begin{cases} y = -\frac{3}{4}x + b \\ 30 = -\frac{3}{4}(0) + b \\ b = 30 \end{cases}$

$y = -\frac{3}{4}(x) + 30$

plug in y: $15 = -\frac{3}{4}(x) + 30$

$\left(\frac{-4}{3}\right)\cdot(-15) = (x)$

$x = 20$

put pt. on graph (20, 15)

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

ANS: Opportunity cost for a spear?

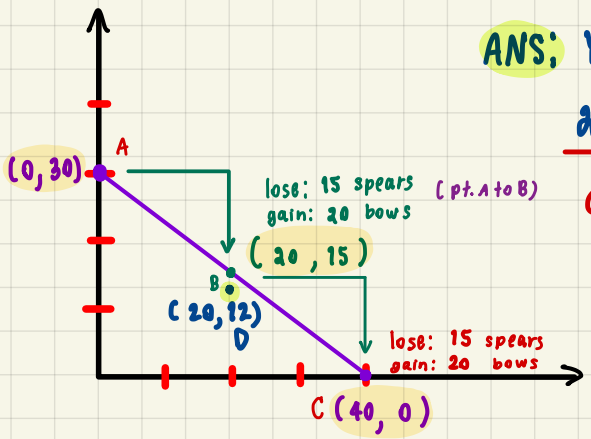
↳ 20 bows = 15 spears

$\frac{20}{15}$ bows = 1 spear

∴ 1 spear = $\frac{4}{3}$ = 1.333 bows

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.

(20, 12) (spears, bows) ?



ANS: Yes, it is possible for the civilization to produce 20 spears & 12 bows. (D) since the point (20, 12) does not go beyond the frontier/ limitation of PPC. (There are sufficient resources.)

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.

↳ new method : 1 bow = 1.5 units of wood

1 spear = 4 units of wood (same)

→ $4 \cdot 30 = 120$ → (bow, spear) → (0, 30)

→ $1.5 \cdot 80 = 120$ → (80, 0)

↳ $m = \frac{30-0}{0-80} = -\frac{3}{8}$

$y = mx + b$

$30 = -\frac{3}{8}(0) + b$

$b = 30$

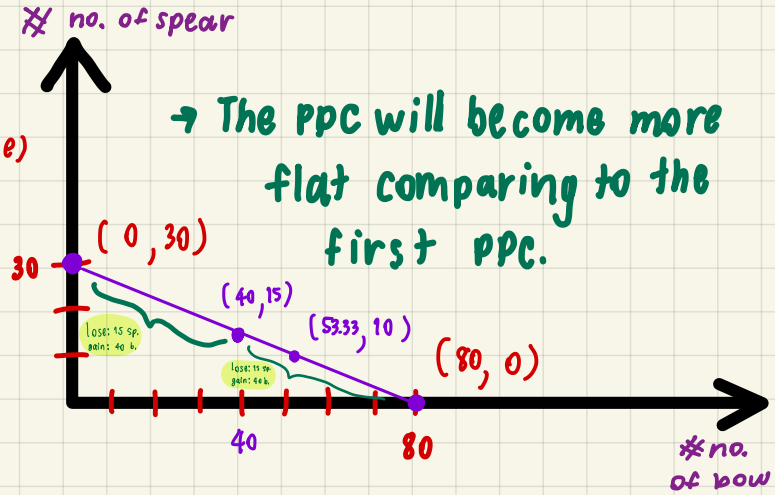
$15 = -\frac{3}{8}(x) + 30$

$-15 = -\frac{3}{8}(x)$

$x = -15 \cdot \frac{-8}{3}$

$x = 40$

(40, 15)



→ The ppc will become more flat comparing to the first ppc.

↳ This means that you will gain twice the amount of bow compared to the first ppc if you choose at (40, 15)

↳ The opportunity cost for a spear → 40 bows = 15 spears

$\frac{40}{15}$ bows = 1 spear

* It is still perfectly substitutable!

1 spear = 2.6667 bows

↳ You will lose more bows for a spear than the previous opportunity cost @ 1 spear = 1.333 bows

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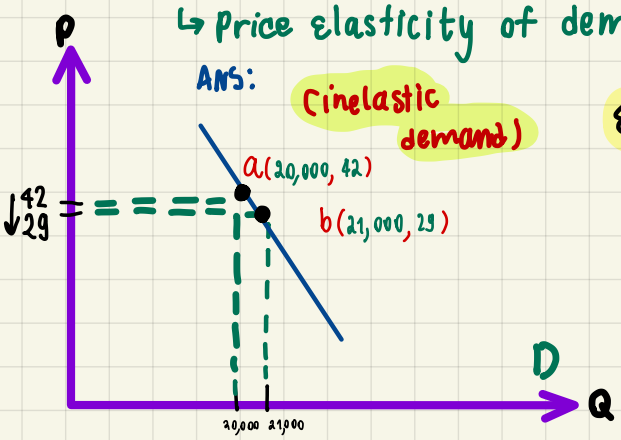
2. Few years ago, the MRT Purple Line electrical train opened to the public but with unexpected low ridership, the operator of MRT decided to lower the fare from 42 to 29 baht per trip. As a result, the number of passengers increased from 20,000 to 21,000 commuters.

↳ from 42 to 29 baht / trip = Passengers ↑ from 20,000 to 21,000 com.

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

↳ Price elasticity of demand for MRT Purple Line = ?

ANS: (inelastic demand)



$\varepsilon_{d\,(avg)} = \frac{\%\Delta Q_d}{\%\Delta P} = \left(\frac{Q_2 - Q_1}{Q_1}\right) \div \left(\frac{P_2 - P_1}{P_1}\right)$

$= \left(\frac{Q_2 - Q_1}{P_2 - P_1}\right)\left(\frac{P_1}{Q_1}\right)$ (slope of d. line)

(Point ε_d)

$= \frac{21{,}000 - 20{,}000}{29 - 42}\left(\frac{42}{20{,}000}\right)$

$= \frac{1{,}000}{-13} \cdot \frac{42}{20{,}000}$

$= -\frac{21}{130} = -0.162$ //

(inelastic demand)

$\varepsilon_d < 1$

as $|\varepsilon_d| = 0.162$

∴ as Price increase by 1%, the Q_d ↓ decreased by 0.162%

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.

Price { 1st reduction : 42 to 29 per trip
2nd reduction : 29 to 15 per trip

→ Price reduction strategy = will help increasing total revenue of MRT?

Total revenue = price x Q. (21,000, 29) / (? , 15)

↳ 1st reduction : Total revenue = (29 · 21,000) = 609,000

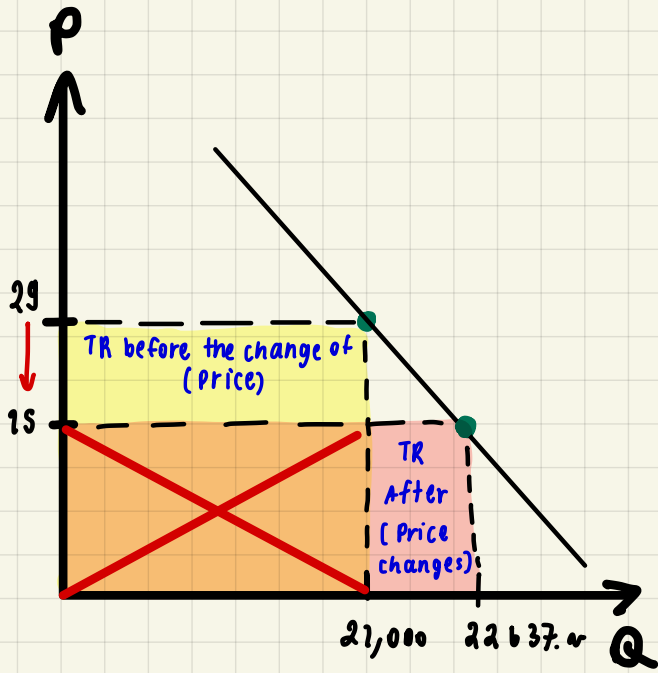
and reduction : Total revenue = (15 · Q_{end}) = ?

↳ $\varepsilon_d = \left(\frac{Q_2 - Q_1}{P_2 - P_1}\right)\left(\frac{P_1}{Q_1}\right) = \frac{-21}{130}$

→ $\left(\frac{X - 21{,}000}{15 - 29}\right)\left(\frac{29}{21{,}000}\right) = \frac{-21}{130}$

→ $\left(\frac{X - 21{,}000}{-14}\right)\left(\frac{29}{21{,}000}\right) = \frac{-21}{130}$

$\frac{29X - 609{,}000}{-294000} = \frac{-21}{130}$



$29X - 609{,}000 = \left(\frac{-21}{130} \cdot -294000\right)$

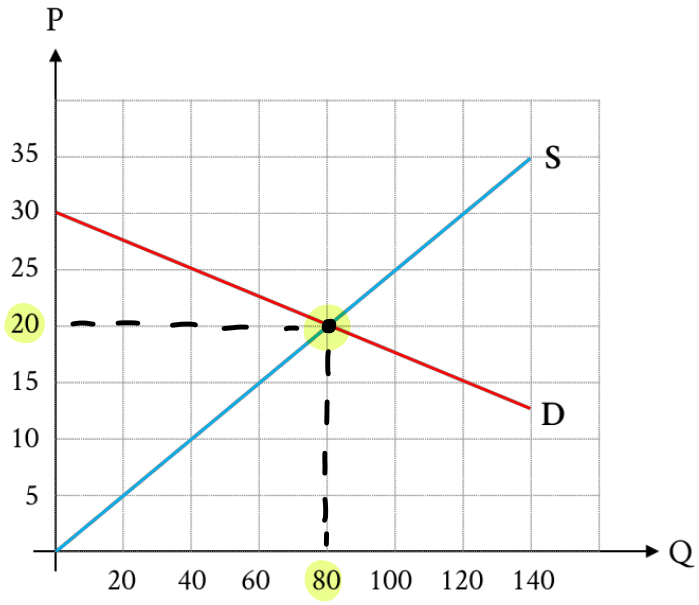
$29X = \left(\frac{617400}{13}\right) + 609000$

$X = \frac{656492.3077}{29}$

[New Quanitity demand] = 22637.66578 //

↳ The Qd increases from 21000 to 22637.66578. However, the total revenue become lesser. We can conclude that the price-reduction strategy does not help increasing total revenue.

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

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?

3c) Total quantity = 40 pairs
= price • quantity

3 a) Price elasticity of demand & supply

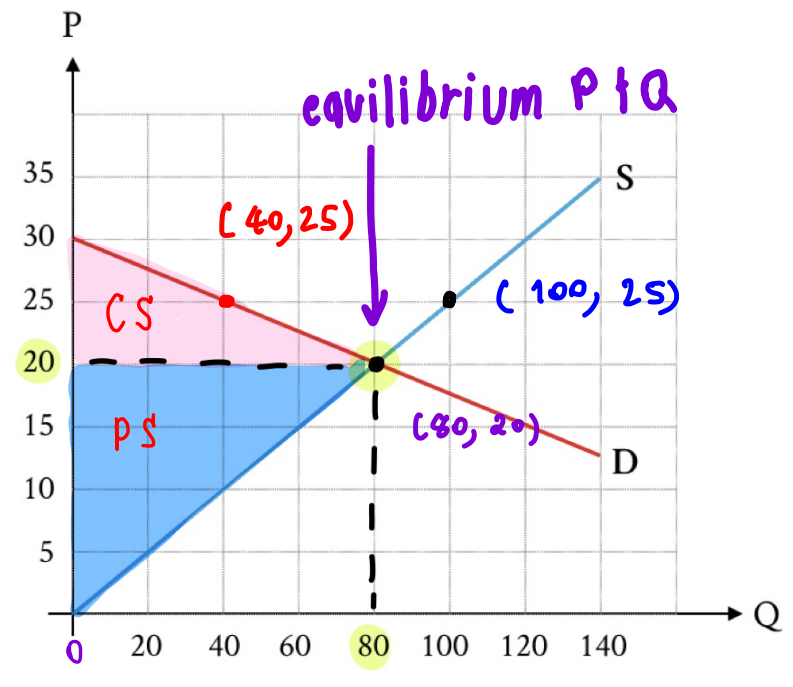
$$\varepsilon_d = \left(\frac{Q_2 - Q_1}{P_2 - P_1}\right)\left(\frac{P_1}{Q_1}\right)$$

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

$$= \left(\frac{-40}{-5}\right)\left(\frac{1}{4}\right) = 8 \cdot \frac{1}{4}$$

$$= 2 \ //$$

$$\therefore \varepsilon_d = 2 \ //$$



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

$$= \left(\frac{100 - 80}{25 - 20}\right)\left(\frac{20}{80}\right)$$

$$= \left(\frac{20}{5}\right)\left(\frac{20}{80}\right)$$

$$= 4 \cdot \frac{1}{4} = 1 \ //$$

$$\therefore \varepsilon_s = 1 \ //$$

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

area $\triangle = \frac{1}{2}(b \cdot h)$

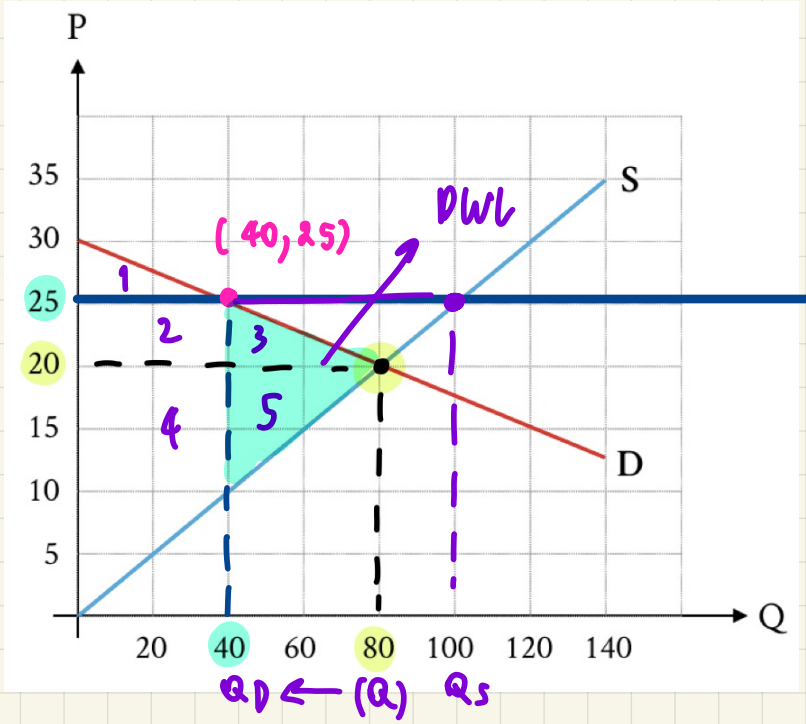
↳ Consumer surplus: $\frac{1}{2}(80 \times 10) = \frac{800}{2} = 400 \ //$

↳ producer surplus: $\frac{1}{2}(80 \times 20) = \frac{1600}{2} = 800 \ //$

(@ socially optimum price & 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.

↳ Producers become monopoly → can charge (P) @ $25 // total quantity = 40 pairs
↳ change = ?



↳ This will cause excess supply → QS ↔ QD

↳ The Price will move to pf @ 25
The quantity will go down to (qd)

Surplus	Before	After	Diff.
CS	1+2+3	1	-2-3
PS	4+5	2+4	+2 -5
Total	1+...+5	1+2+4	-3 -5

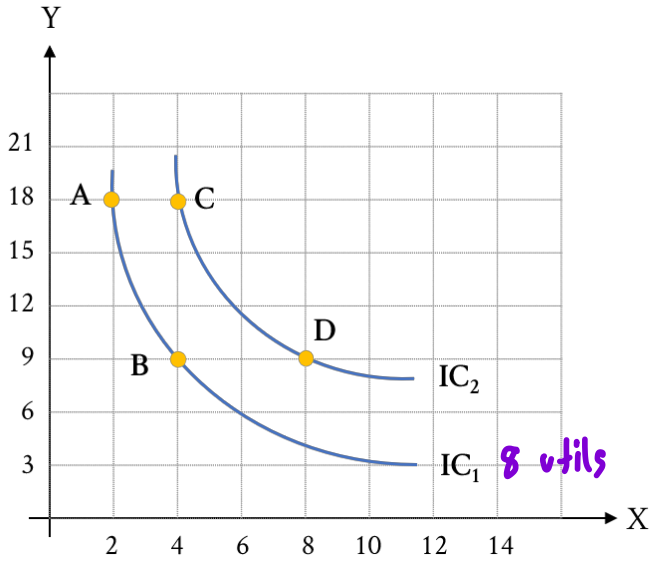
3.d) Is there any deadweight loss due to the collusion? If there is, how much is it?

↳ There is deadweight loss due to the collusion.

It is at $\left(\frac{1}{2} \cdot 10 \cdot 40\right) + \left(\frac{1}{2} \cdot 5 \cdot 40\right)$

$= 200 + 100 = 300$

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)

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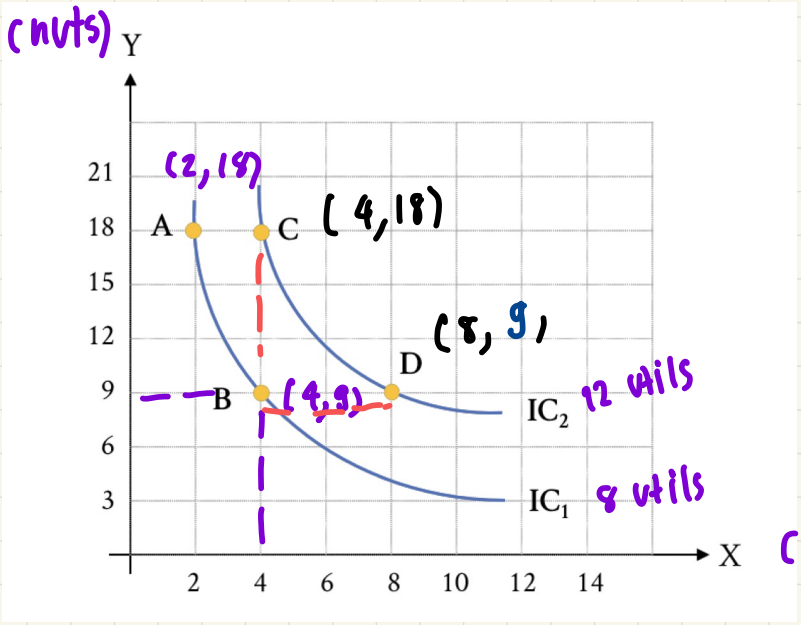
4)



slope of IC $= \frac{MUx}{MUy}$

slope of BL. $= \frac{Px}{Py}$

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?

$$\frac{MUx}{MUy} = \frac{Px}{Py} \rightarrow \frac{9-18}{4-2} = \frac{Px}{10}$$

$$4.5 \,|-4.5| = \frac{Px}{10}$$

slope of IC : MRS_{xy}

$$Px = 45 //$$

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?

At pt. B → $I = Px \cdot X + Py \cdot y$

$I = 180 \cdot 4 + 9Py$

slope: $\frac{MUx}{MUy} = \left|\frac{y_2 - y_1}{x_2 - x_1}\right|$

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

find Py $\quad \frac{MUx}{MUy} = \frac{Px}{Py}$

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

$Py = (180 \cdot 2) \div 9$

$Py = 40 //$

income:

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

$I = 720 + 360$

$I = 1080$ *

∴ So, the consumer has to achieve 1080 Baht

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

↳ from C to D

→ C to B, The consumer loses 4 units and consumes 9 or nuts less than 9 units.
(moving from $IC_2 \rightarrow IC_1$)

→ B to D, the consumer gains 4 units and consumes 4 units more of x or avocado.
(returns to IC_2)

↳ So, consuming 4 more avocados or x will equal to 9 units of MUx.

$$\text{The average of } MUx = \frac{\Delta \text{ of total } U}{\Delta \text{ of total units consumed}} = \frac{9}{4} = 2\frac{1}{4}$$

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)

↳ IC_1: pt. A to B: $\left(\frac{-9}{2}\right) = MRS_{xy}$ → The consumer's willing to sacrifice 9 units of nuts (y) and will gain 2 units of avocadoes instead. [moving from (2,18) to (4,9)]

↳ IC_2: pt. C to D: $\left(\frac{-9}{4}\right) = MRS_{xy}$ → The consumer's willing to sacrifice 9 units of nuts (y) and will gain 4 units of avocadoes instead [moving from (4,18) to (8,9)]

∴ Law of diminishing marginal utility explains that MU decreases as the consumer keep on consuming the product. This consumer will need more avocadoes to stay at the same utility.