

### 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 least 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 <sup>✓</sup>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.

## Assignment 1

Assigned on Feb 17<sup>th</sup>, 2022. To be submitted on Feb 26<sup>th</sup>, 2022 before midnight

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.  $20(4) = 80$   
 $3(12) = 36$

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.

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

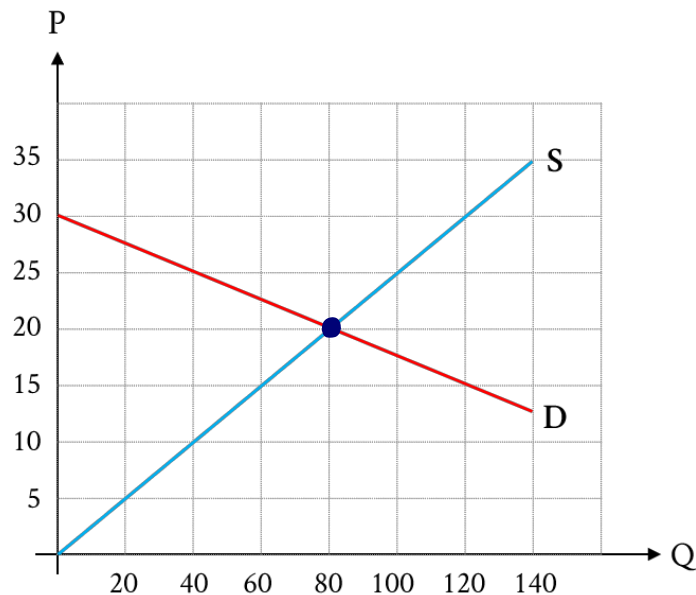
2.b) If the MRT operator decides to reduce the fare even further from 29 to 15 baht per trip. Do you think this price-reduction strategy will help increasing total revenue of MRT Purple Line? Give a clear explanation with support of a diagram.  $5148 \uparrow ?$

elastic or inelastic.

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

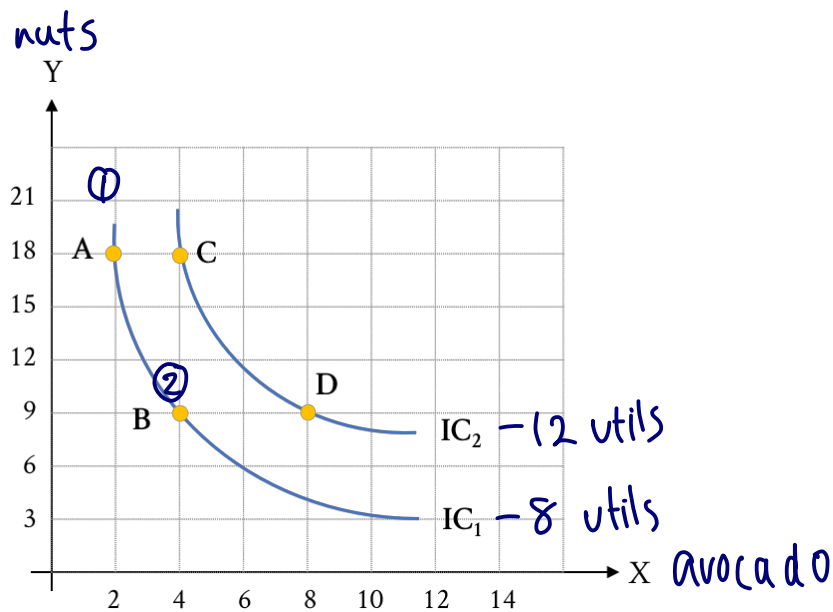


- 3.a) Calculate price elasticity of demand and price elasticity of supply at the equilibrium price.
- 3.b) Calculate both consumer and producer surplus at the socially optimum price and quantity.
- 3.c) Now supposed that all the producers collude and become a monopoly, they can charge the price at \$25. 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?

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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 IC<sub>1</sub> and IC<sub>2</sub> respectively, show your work and answer the following questions.



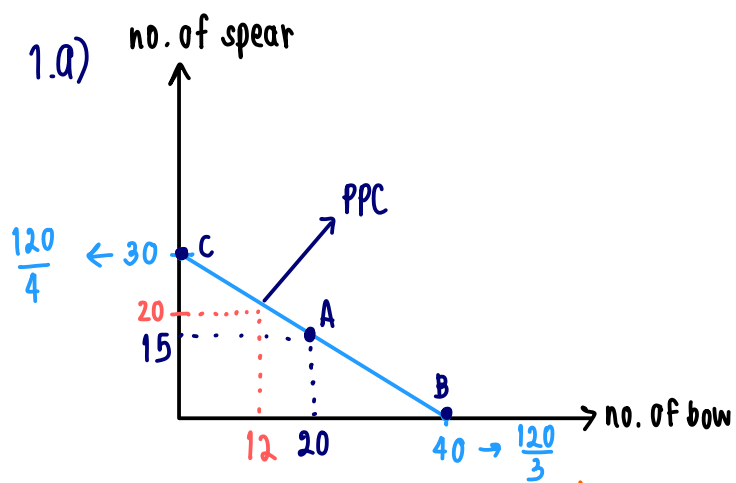
4.a) Measured from point A to B, assumed P<sub>y</sub> is 10 baht per unit, how much P<sub>x</sub> must be to make you conclude that the consumer's equilibrium is on point B?

4.b) Measured from point A to B, assumed P<sub>x</sub> is 180 baht per unit, how much budget does this consumer have 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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on point A, B : utilize all the resources to produce but different amount of products.

To move A → B : loose 15 spears to get 20 bows. Causing 'trade off'

To move A → C : loose 20 bows to get 15 spears Causing 'trade off'

Note spear & bow = Complementary goods

1.b) opportunity cost for a spear, in term of bow?

gain 15 spears, loose 20 bows  
 gain 1 spear, loose  $\frac{20}{15} = 1.333$  bows

∴ opportunity cost for a spear = 1.333 bows#

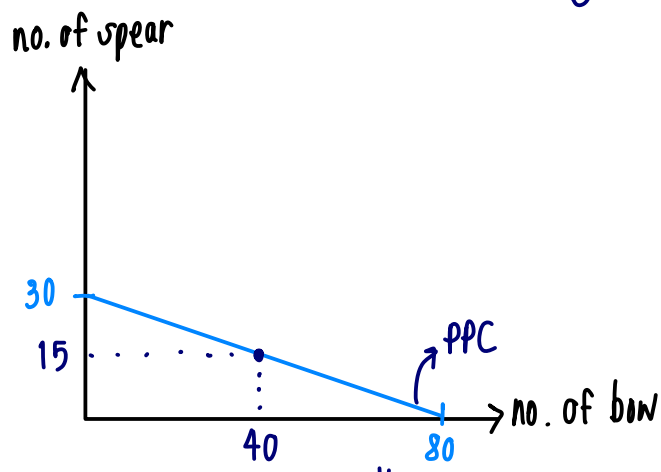
1.c) 20 spears → 20(4) = 80 units of wood } 116 < 120 ✓  
 12 bows → 12(3) = 36 units of wood }

∴ It is possible for this civilization to produce 20 spears and 12 bows BUT  
 This option is not efficient because there will be some resources left and not fully utilized.

1.d) total units = 120 <math>\left\{ \begin{array}{l} \text{spear } 4 \rightarrow 120/4 = 30 \\ \text{bow } 1.5 \rightarrow 120/1.5 = 80 \end{array} \right.</math>

to calculate opportunity cost for a spear

gain 15 spears, loose 40 bows  
 gain 1 spears, loose  $\frac{40}{15} = 2.667$  bows



∴ The amount of bow that can produce from all of the resources will increase therefore, PPC will be flatter. This also cause the opportunity cost to increase. The opportunity cost for a spear now is 2.667 bows. #

2.a) price elasticity of demand  $\rightarrow$  percentage change in quantity demanded for 1 percent of price increase.

$$\epsilon_d = \frac{P_1}{Q_1} \cdot \frac{Q_2 - Q_1}{P_2 - P_1} = \frac{42}{20000} \cdot \frac{21000 - 20000}{29 - 42} = -\frac{21}{130} = -0.162 \rightarrow |-0.162| < 1 = \text{inelastic}$$

$$\therefore \frac{-0.162}{1} = \frac{\% \Delta Q_d}{\% \Delta P} \rightarrow \text{When price increases by 1\%, } Q_d \downarrow \text{ by 0.162\%}$$

2.b) Total revenue (TR) =  $P \cdot Q$

$\rightarrow$  Before  $29 \cdot 21000 = 609000$

$\rightarrow$  After  $15 \cdot Q_2 = 15 \cdot 22637.66578 = 339564.9867$ .

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

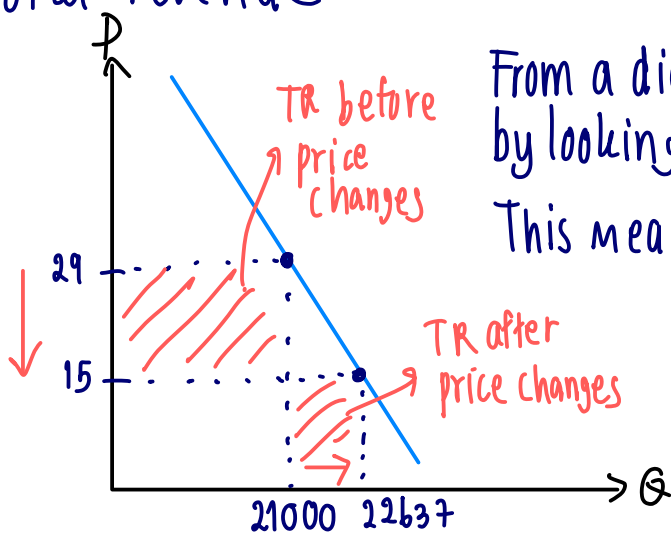
$$\frac{29X - 609000}{-294000} = \frac{-21}{130}$$

$$29X - 609000 = \frac{617400}{13}$$

$$29X = 656492.3077$$

$$Q_2 = X = 22637.66578$$

$\therefore$  Comparing before and after total revenue from the price-reduction strategy. Even though the quantity demanded increases from 21000 to 22637.66578 but total revenue is lesser. We can conclude that this price-reduction strategy doesn't help increasing total revenue.



From a diagram, when  $P \downarrow$ ,  $TR \downarrow$  by looking at the shaded area.

This means MRT is an inelastic demand.

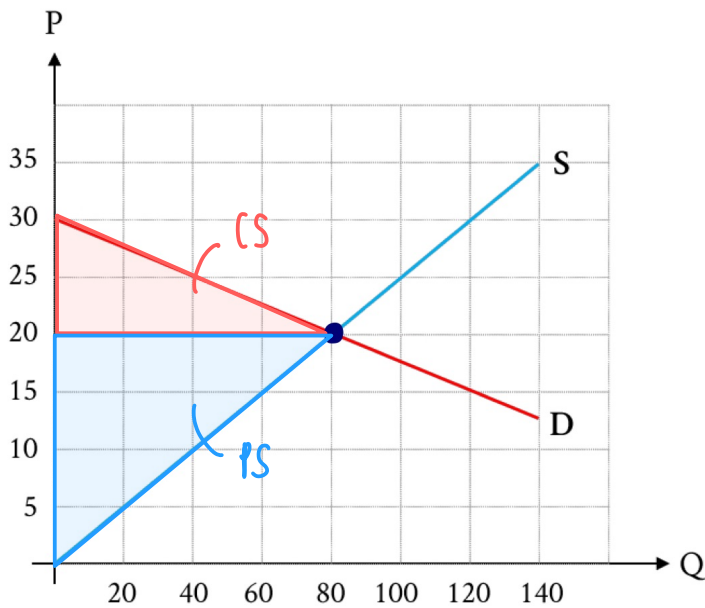
$$3.a) \epsilon_d = \frac{\% \Delta Q_d}{\% \Delta P} = \frac{Q_2 - Q_1}{P_2 - P_1} \cdot \frac{P_1}{Q_1} = \frac{40 - 80}{25 - 20} \cdot \frac{20}{80} = -\frac{40}{5} \cdot \frac{20}{80} = -\frac{4}{1} \cdot \frac{20}{80} = -\frac{4}{4} = -1 = \frac{-1}{1}$$

$\therefore$  when  $p \uparrow 1\%$ ,  $Q_d \downarrow 1\%$

$$\epsilon_s = \frac{\% \Delta Q_s}{\% \Delta P} = \frac{Q_2 - Q_1}{P_2 - P_1} \cdot \frac{P_1}{Q_1} = \frac{100 - 80}{25 - 20} \cdot \frac{20}{80} = \frac{20}{5} \cdot \frac{20}{80} = \frac{4}{4} = \frac{1}{1}$$

$\therefore$  when  $p \uparrow 1\%$ ,  $Q_s \uparrow 1\%$

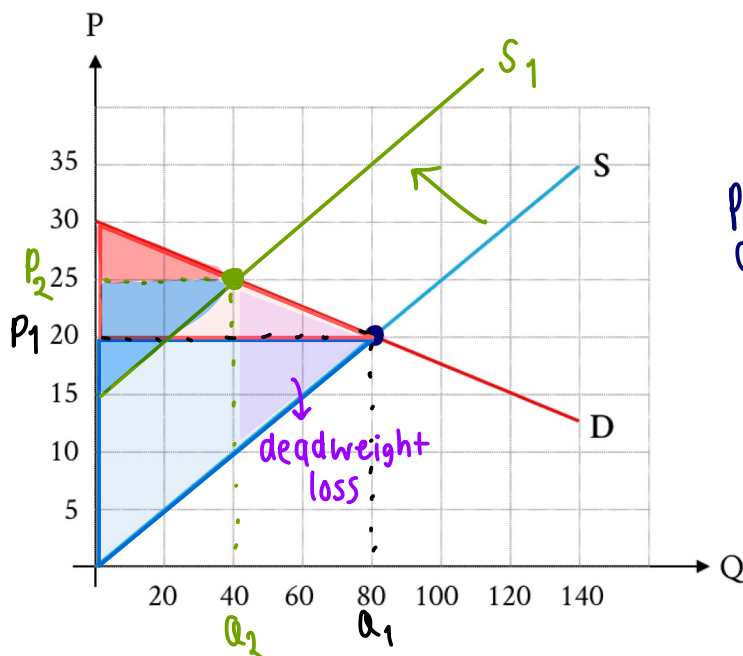
3.b)



$$CS: \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 10 \times 40 = 200 \#$$

$$PS: \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times 80 \times 20 = 800 \#$$

3.c)



$P \uparrow$   $Q \downarrow$   
 producer surplus smaller  
 consumer surplus smaller

3.d) There is a dead weight loss

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

$$100 + 200 = 300 \#$$

4.a) consumer's equilibrium  $\rightarrow \frac{MU_x}{MU_y} = \frac{P_x}{P_y} \rightarrow \frac{9-18}{4-2} = \frac{P_x}{10}$   
 $\frac{y_2-y_1}{x_2-x_1} = \left| \frac{\Delta y}{\Delta x} \right|$   
 $|-4.5| = \frac{P_x}{10}$   
 $P_x = 45 \#$

4.b) At point B  $\rightarrow I = P_x \cdot x + P_y \cdot y$   
 $I = 180(4) + 9P_y$   
slope  $\frac{MU_x}{MU_y} = \left| \frac{y_2-y_1}{x_2-x_1} \right| = \left| \frac{9-18}{4-2} \right| = \left| \frac{-9}{-2} \right| = \frac{9}{2}$

Find  $P_y$   $\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$   
 $\frac{9}{2} = \frac{180}{P_y}$   
Income  $I = 180(4) + 9(40)$   
 $I = 720 + 360$   
 $I = 1080 \#$

$P_y = (180 \cdot 2) \div 9 \quad \therefore$  consumer has to achieve 1080 baht #  
 $P_y = 40 \#$

4.c) From C  $\rightarrow$  D,

1. C  $\rightarrow$  B, consumer loses 4 utils and consume nuts(y) less 9 units.

Moving from  $IC_2 \rightarrow IC_1$

2. B  $\rightarrow$  D, consumer gains back 4 utils and consumer 4 units more of avocado(x), Returning to  $IC_2$

3. Consuming 4 more avocados(x) yields 4 utils of  $MU_x$

$\therefore$  The average  $MU_x = \frac{\text{Change in total } U}{\text{Change in no. of units consume}} = \frac{4}{4} = 1 \#$

4.d) On  $IC_1$ , from A  $\rightarrow$  B  $\left( \frac{\Delta y}{\Delta x} = \frac{-9}{2} \right)$  consumer is willing to sacrifice 9 units of nuts(y) and gain 2 units of avocados (from 2  $\rightarrow$  4)

on  $IC_2$ , from C  $\rightarrow$  D  $\left( \frac{\Delta y}{\Delta x} = \frac{-9}{4} \right)$  consumer is willing to sacrifice 9 units of nuts(y) and gain 4 units of avocados (from 4  $\rightarrow$  8)

$\therefore$  Law of diminishing marginal utility states that MU decreases when you keep consuming the product. Since  $MU_y$  of  $IC_1$  and  $IC_2$  are equal, we can see that this consumer requires more avocados to maintain the same utility. #