

PROBLEM SET 1 – Tutorial Week 3 (August 22–25)

Deadline: 11:59 p.m. two days before your tutorial. Please submit a PDF in groups of 2–3 within your tutorial group. On the first page, write your full names (as on the roster) in alphabetical order. Start each question on a new page. Name your PDF “PSet # - LastName LastName LastName,” e.g., “PSet 1 - Banerjee Duflo Kremer.” Points will be deducted for not adhering to the instructions.

QUESTION 1

Helen likes flying a plane (x) and riding a motorcycle (y). Her utility function for these two activities is $U(x, y) = 5x^3y^2$.

- (a) Calculate MU_x , her marginal utility with respect to flying a plane.
- (b) Calculate MU_y , her marginal utility with respect to riding a motorcycle.
- (c) Calculate $MRS_{x,y}$, the rate at which she is willing to substitute flying a plane for riding a motorcycle, in terms of x and y .

Last Saturday, Helen spent 1 hour flying a plane and 3 hours riding a motorcycle. This Saturday, Helen has decided to spend 2 hours flying a plane and 1 hour riding a motorcycle.

- (d) Compare Helen’s utility level this Saturday to her utility level last Saturday.
- (e) Compare Helen’s $MRS_{x,y}$ this Saturday to her $MRS_{x,y}$ last Saturday. Explain.

QUESTION 2

Suppose you are choosing between hours of work (a bad measured on the x -axis) and money (a desirable good measured on the y -axis).

- (a) Explain in words the economic interpretation of the marginal rate of substitution of hours of work for money, $MRS_{x,y}$.
- (b) Should $MRS_{x,y}$ be positive or negative in this case? Explain.
- (c) Is $MRS_{x,y}$ increasing, constant, or decreasing along an indifference curve as hours of work increase? Explain.
- (d) Draw your indifference curve, showing hours of work on the x -axis and money on the y -axis.

QUESTION 3

There are two goods in the world: chocolate (x) and rum (y). For each of the following cases:

- (i) Specify the type of preference, e.g., perfect substitutes, perfect complements.
- (ii) Draw a set of indifference curves, with chocolate on the x -axis and rum on the y -axis, to represent the individual’s preference for the two goods. Draw an arrow indicating the direction in which utility is increasing.
- (iii) Write a utility function that describes the individual’s preference for the two goods.

- (a) Bob likes chocolate, but is neutral about rum (i.e., his utility is not affected by how much rum he consumes).
- (b) Helen has to have chocolate and rum in a ratio of three pieces of chocolate to a snifter of rum; chocolate or rum in excess of this ratio does not add to her utility.
- (c) Violet is always willing to give up three snifters of rum for a piece of chocolate.
- (d) Dash loves chocolate, but complains bitterly whenever he is served rum. For every snifter of rum he consumes, he needs a piece of chocolate to offset the disutility from the snifter of rum.
- (e) Jack Jack hates both chocolate and rum; a piece of chocolate is just as bad as a snifter of rum.

Hint: For a given utility level, find two or three consumption baskets to map the indifference curve. To determine the direction in which utility is increasing, pick one consumption basket, and consider how utility changes when we increase x by one unit, when we increase y by one unit, etc.

QUESTION 4

There are two goods in the world: sushi (x) and sake (y). Violet's utility function is $U(x, y) = \min\{x, y\}$. She has an income of \$360. For each of the following cases, write the budget line equation. Draw a graph showing Violet's indifference curves and budget line. Find her optimal choice using graphical analysis. (Note: Draw separate graphs for (a), (b), and (c).)

- (a) Sushi costs \$60 per platter and sake costs \$60 per bottle.
- (b) Suppose the restaurant runs a promotion where sushi now costs \$30 per platter. Sake still costs \$60 per bottle.
- (c) Suppose instead the promotional price of \$30 per platter of sushi is limited to the first 4 platters purchased; beyond 4 platters, the price reverts to \$60 per platter.

Hint: Calculate the cost of 1 platter of sushi, 2 platters of sushi, 3 platters of sushi, etc. For each quantity of sushi purchased, how many bottles of sake can be purchased? Plot the points on the graph.

Now consider Violet's brother, Dash, who has a utility function of $U(x, y) = x + 2y$. Like Violet, Dash has an income of \$360. For each of the following cases, draw a graph showing Dash's indifference curves and budget line. Find his optimal choice using graphical analysis. (Note: Draw separate graphs for (d), (e), and (f).)

- (d) Sushi costs \$60 per platter and sake costs \$60 per bottle.
- (e) Suppose the restaurant runs a promotion where sushi now costs \$30 per platter. Sake still costs \$60 per bottle.
- (f) Suppose instead the promotional price of \$30 per platter of sushi is limited to the first 4 platters purchased; beyond 4 platters, the price reverts to \$60 per platter.

Hint: Calculate the cost of 1 platter of sushi, 2 platters of sushi, 3 platters of sushi, etc. For each quantity of sushi purchased, how many bottles of sake can be purchased? Plot the points on the graph.