

PROBLEM SET 2 – Tutorial Week 4 (August 29–September 1)

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 2 – Banerjee Duflo Kremer.” Points will be deducted for not adhering to the instructions.

QUESTION 1

Suppose Hei Hei’s preferences for grain (x) and worms (y) can be represented by the utility function $U(x, y) = 6\sqrt{x} + y$.

- (a) Is monotonicity satisfied for both x and y ?
- (b) As the consumption of x increases, does the marginal utility of x increase, diminish, or remain constant?
- (c) As the consumption of y increases, does the marginal utility of y increase, diminish, or remain constant?
- (d) Find $MRS_{x,y}$. As the consumption of x increases along an indifference curve, does $MRS_{x,y}$ increase, diminish, or remain constant?
- (e) Use Excel to draw a graph of the indifference curves $U(x, y) = 20$ and $U(x, y) = 30$. Indicate on your graph whether the indifference curves will intersect the x -axis, the y -axis, both axes, or neither axis. Include a screenshot of your Excel calculations.

QUESTION 2

Moana derives utility from days spent traveling domestically (d) and days spent traveling in a foreign country (f), as given by the utility function $U(d, f) = df$. The price of a day spent traveling domestically is \$100, the price of a day spent traveling in a foreign country is \$400, and Moana’s annual travel budget is \$4,000. (*Note: D and F need not be integers.*)

- (a) Use Excel to draw a graph of the indifference curve associated with a utility level of $U(d, f) = 75$, with domestic travel (d) on the x -axis and foreign travel (f) on the y -axis. Include a screenshot of your Excel calculations.
- (b) Draw Moana’s budget line on the same graph.
- (c) Write down Moana’s utility maximization problem. Use the Lagrange multiplier method to solve for her optimal choice of days spent traveling domestically and days spent traveling in a foreign country.

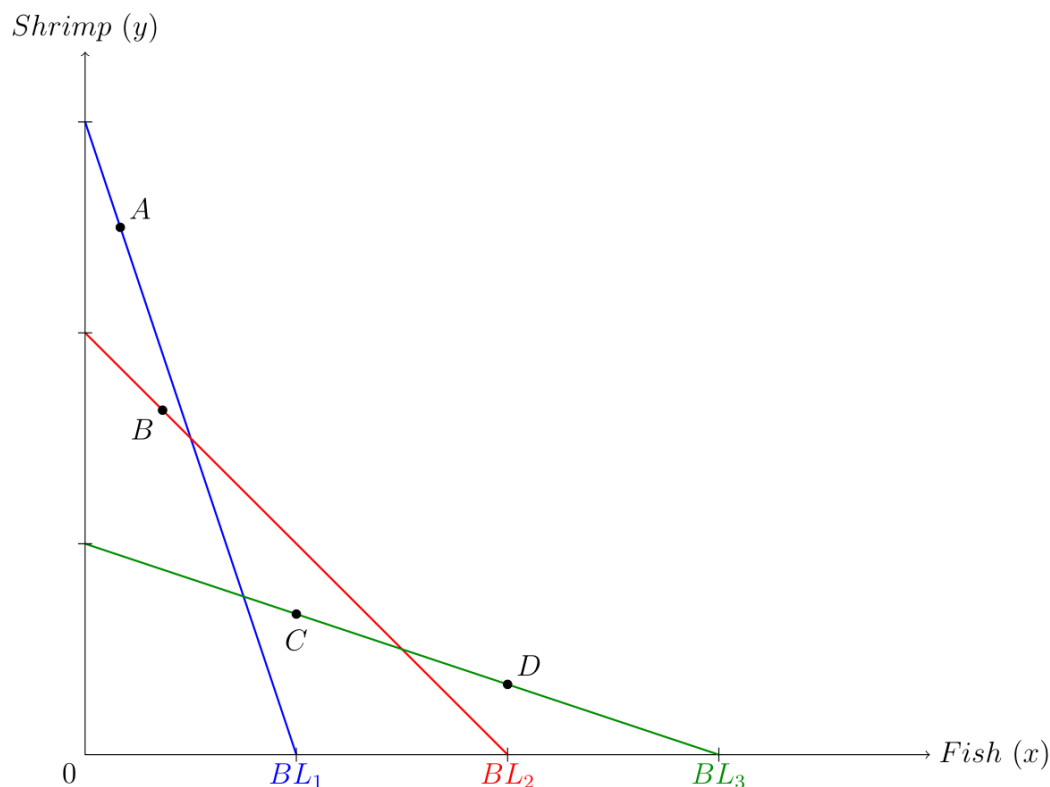
QUESTION 3

Pua's utility function for coconuts (x) and pineapples (y) is $U(x, y) = \sqrt{xy}$. A coconut (x) costs \$4, a pineapple (y) costs \$4, and Pua has an income of \$400.

- Find Pua's optimal basket. Draw a graph of the budget line and the indifference curve going through the optimal choice; indicate the optimal choice.
- Suppose Pua receives a cash subsidy of \$320. Write down the utility maximization problem. Find Pua's optimal basket with the cash subsidy. Draw a graph of the budget line and the indifference curve going through the optimal choice; indicate the optimal choice.
- Suppose instead of the cash subsidy, Pua receives a \$320 voucher that can only be spent on coconuts (x). Write down the utility maximization problem. Find Pua's optimal basket with the voucher. Draw a graph of the budget line and the indifference curve going through the optimal choice; indicate the optimal choice.
- Repeat (b) and (c), but now consider a cash subsidy of \$480 and a voucher of \$480 that can only be spent on coconuts (x). Compare Pua's optimal basket with the cash subsidy and Pua's optimal basket with the voucher.

QUESTION 4

As shown in the following figure, Maui consumes two goods: fish (x) and shrimp (y). Assume Maui maximizes utility, and his preference satisfies completeness, transitivity, and monotonicity. Given budget line BL_1 , he chooses basket A; given budget line BL_2 , he chooses basket B; and given budget line BL_3 , he chooses basket C.



- (a) What can you infer about how Maui ranks baskets A , B , C , and D ?
- (b) On the graph, indicate the areas that are strictly less preferred to basket B . Explain.
- (c) On the graph, indicate the areas that are strictly preferred to basket B . Explain.