

PROBLEM SET 5 – Tutorial Week 8 (October 3–6)

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

QUESTION 1

Remy and Emile consume only cheese (x_1) and strawberries (x_2). Remy’s preferences are described by $U^R = \min\{x_1^R, 2x_2^R\}$ while Emile’s preferences are described by $U^E = x_1^E + x_2^E$. Remy has 8 pieces of cheese (x_1) and 1 pint of strawberries (x_2) while Emile has 4 pieces of cheese (x_1) and 3 pints of strawberries (x_2).

- Draw an Edgeworth box with x_1 on the horizontal axis and x_2 on the vertical axis. Position Remy on the bottom left corner and Emile on the top right corner. Indicate the total number of units of x_1 and x_2 . Label the endowment allocation. Show Remy’s and Emile’s indifference curves.
- Derive the equation of the contract curve. In your graph in (a), draw the contract curve.
- Set x_1 as the numeraire, i.e., assume $p_1 = 1$ and $p_2 = p$. Find the competitive equilibrium.
Hint: For Emile to consume at a Pareto-efficient allocation, what should the prices be?
- Redraw the Edgeworth box. Indicate the equilibrium allocation, e . Draw the equilibrium budget line.

QUESTION 2

Remy and Emile consume only blueberries (x_1) and raspberries (x_2). Remy has utility function $U^R = x_1^R (x_2^R)^2$ and Emile has utility function $U^E = (x_1^E)^2 x_2^E$. Remy is endowed with 5 blueberries and 5 raspberries and Emile is endowed with 10 blueberries and 10 raspberries.

- Derive the equation of the contract curve, i.e., find $x_2^R(x_1^R)$.
- Set x_2 as the numeraire, i.e., assume $p_1 = p$ and $p_2 = 1$. Find the competitive equilibrium – the equilibrium price ratio, p_1/p_2 , and the equilibrium allocation, $((x_1^R, x_2^R), (x_1^E, x_2^E))$.

QUESTION 3

Remy obtains no pleasure from apricots (x_1), and Emile obtains no pleasure from peaches (x_2). Each of them has an initial endowment of 5 apricots (x_1) and 5 peaches (x_2).

- Draw an Edgeworth box with x_1 on the horizontal axis and x_2 on the vertical axis. Position Remy on the bottom left corner and Emile on the top right corner. Indicate the total number of units of x_1 and x_2 . Show Remy’s and Emile’s indifference curves.
- Explain how Remy and Emile can trade in order to improve both their utilities. Redraw the Edgeworth box. Indicate the contract curve and the equilibrium allocation, e . Draw the equilibrium budget line.

QUESTION 4

Remy and Emile consume only eggplant (x_1) and zucchini (x_2). Remy has utility function $U^R = x_1^R - x_2^R$ and Emile has utility function $U^E = x_1^E + x_2^E$. Remy is endowed with 6 eggplant (x_1) and 3 zucchini (x_2) and Emile is endowed with 6 eggplant (x_1) and 3 zucchini (x_2).

- (a) Draw an Edgeworth box with x_1 on the horizontal axis and x_2 on the vertical axis. Position Remy on the bottom left corner and Emile on the top right corner. Indicate the total number of units of x_1 and x_2 . Label the endowment allocation. Show Remy's and Emile's indifference curves.
- (b) Consider allocation B, $((0,0), (12,6))$. Is it Pareto efficient? Why or why not?
- (c) Consider allocation C, $((12,0), (0,6))$. Is it Pareto efficient? Why or why not?
- (d) Consider allocation D, $((12,6), (0,0))$. Is it Pareto efficient? Why or why not?
- (e) Consider allocation E, $((0,6), (12,0))$. Is it Pareto efficient? Why or why not?
- (f) In your graph in (a), draw the contract curve. Write the equation of the contract curve.
- (g) In your graph in (a), indicate the core. Describe the core.
- (h) Redraw the Edgeworth box and include the equilibrium budget line. Is there more than one equilibrium budget constraint? Find the competitive equilibrium allocation.

Hint: Set x_1 as the numeraire, i.e., assume $p_1 = 1$ and $p_2 = p$.