PROBLEM SET 4 – Tutorial Week 6 (September 12–15)

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 4 – Banerjee Duflo Kremer." Points will be deducted for not adhering to the instructions.

QUESTION 1

Suppose Dug's preferences for peanut butter (x) and bacon (y) can be represented by the utility function $U(x, y) = \sqrt{x} + y$.

(a) Use Excel to draw the indifference curves associated with $U(x, y) = 8$ and $U(x, y) = 8.5$. 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.

(b) Assuming we have an interior solution, show that the demand for x does not depend on income.

Suppose Dug has income $M = \$30$ and $p_y = \$4$. Suppose p_x falls from $\$2$ to $\$1$.

(c) Calculate the compensating variation of the fall in p_x.

(d) Calculate the equivalent variation of the fall in p_x.

QUESTION 2

Consider an economy with only two consumers, Russell and Kevin, who consume only chocolate (x_1) and balloons (x_2). Russell's preferences are given by $U^R = \min\{x_1^R, x_2^R\}$ while Kevin's preferences are given by $U^K = \min\{x_1^K, x_2^K\}$. Russell has 3 pieces of chocolate (x_1) and 5 balloons (x_2) while Kevin has 5 pieces of chocolate (x_1) and 3 balloons (x_2).

(a) Draw an Edgeworth box with x_1 on the horizontal axis and x_2 on the vertical axis. Position Russell on the bottom left corner and Kevin on the top right corner. Indicate the total number of units of x_1 and x_2. Label the endowment allocation. Show Russell's and Kevin's indifference curves.

(b) In your graph in (a), draw the contract curve. Write the equation of the contract curve, $x_2^R(x_1^R)$.

(c) Consider allocation C, $\big((8,8),(0,0)\big)$. Is it Pareto efficient? Why or why not?

(d) Consider allocation *D*, $\big((8,0),(0,8)\big)$. Is it Pareto efficient? Why or why not?

(e) Consider allocation *E*, $\big((2,2),(6,6)\big)$. Is moving from the endowment allocation ω to allocation *E* a Pareto improvement?

(f) Consider allocation *F*, $\big((5,1),(3,7)\big)$. Is moving from allocation *F* to the endowment allocation ω a Pareto improvement?

QUESTION 3

Charles and Muntz consume only mangoes (x_1) and pineapples (x_2). Charles' preferences are described by $U^C = x_1^C + 3x_2^C$ while Muntz's preferences are described by $U^M = x_1^M$. Collectively, Charles and Muntz have a total of 6 mangoes and 6 pineapples.

(a) Draw an Edgeworth box with x_1 on the horizontal axis and x_2 on the vertical axis. Position Charles on the bottom left corner and Muntz on the top right corner. Indicate the total number of units of x_1 and x_2. Show Charles' and Muntz's indifference curves.

(b) Consider allocation *B*, $\big((0,0),(6,6)\big)$. Is it Pareto efficient? Why or why not?

(c) Consider allocation C, $\big((6,0),(0,6)\big)$. Is it Pareto efficient? Why or why not?

(d) Consider allocation *D*, $\big((6,6),(0,0)\big)$. Is it Pareto efficient? Why or why not?

(e) Consider allocation *E*, $\big((0,6),(6,0)\big)$. 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, $x_2^C(x_1^C)$.

QUESTION 4

Carl has 7 arepas (x_1) and 2 empanadas (x_2) while Ellie has 3 arepas (x_1) and 3 empanadas (x_2). They have the same utility function, $U^i = \ln(x_1^i) + 2\ln(x_2^i)$, where $i = C, E$.

(a) Draw an Edgeworth box with x_1 on the horizontal axis and x_2 on the vertical axis. Position Carl on the bottom left corner and Ellie on the top right corner. Indicate the total number of units of x_1 and x_2. Label the endowment allocation.

(b) Is the endowment allocation Pareto efficient? Why or why not?

(c) Derive the equation of the contract curve, i.e., find $x_2^C(x_1^C)$. In your graph in (a), draw the contract curve.