The homework is due on Wednesday, September 23. Each question is worth 0.8 points. No partial credits.

For the graphic arguments, use the attached graphing paper.

Question 1

(a) A utility function is given by \( u(x_1, x_2) = \min\{1.5x_1 + 1.5x_2, 3x_1 + x_2\} \). Graph the indifference curves through the following points: (4, 4), (8, 8), and (12, 12).

(b) Graphically determine the optimal consumption for the following prices and income: \( p_1 = 2, p_2 = 1, I = 20 \). \( p_1 = 1, p_2 = 2, I = 20 \).

(c) Suppose that prices are \( p_1 = 3, p_2 = 2 \). Determine the Hickean demand for a consumer to obtain utility 60.

(d) Suppose that prices are \( p_1 = 1, p_2 = 3 \). Determine the Hickean demand for a consumer to obtain utility 60.

Question 2

Suppose that a utility function is given by \( u(x_1, x_2) = 2x_1 + x_2 \). Suppose prices are \( p_1 = 3, p_2 = 2 \). Determine graphically the least costly consumption that gives a utility of 20. What is the minimum expenditure?

Question 3

A utility function is given by \( u(x_1, x_2) = \min\{2x_1 + x_2, x_1 + 3x_2\} \). Suppose you want to obtain a utility of 50. Determine graphically the solution of the expenditure minimization problem for the following prices:

(a) \( p_1 = 4, p_2 = 3 \).

(b) \( p_1 = 4, p_2 = 1 \).

Clearly indicate the feasible set by shading it.

Question 4

Suppose there at price \( p_1 = 1, p_2 = 2 \) and income \( I = 20 \) a consumer chooses consumption bundle \( x \). At prices \( p_1 = 2, p_2 = 1 \) and income \( I = 20 \) the consumer chooses consumption bundle \( y \), where \( y \neq x \). Show by means of three graphs that all off the following are possible (assuming standard preferences with decreasing MRS). (a) \( x > y \), (b) \( x \sim y \), (c) \( y > x \).

Question 5

Suppose a utility function is given by \( u(x_1, x_2) = x_1^2 + x_2^2 \). Graph the indifference curve for utility level 100 and 400. What is wrong about the shape of the indifference curves? Does the utility function describe reasonable preferences?

Now suppose prices are \( p_1 = 1, p_2 = 2 \) and \( I = 10 \). Determine the optimal consumption graphically.