Microeconomics: Monika Köppl-Turyna

Problem Set 2

Key concepts:

- Utility
- Marginal utility
- Indifference curve
- Marginal rate of substitution
- Budget constraint

1. What kind of preferences are given by the following utility functions? How do the indifference curves look like? Find examples of goods, for which these preferences seem a plausible description:
   (a) $u(x_1, x_2) = x_1 \cdot x_2$
   (b) $u(x_1, x_2) = x_1 + 2x_2$
   (c) $u(x_1, x_2) = \min[2x_1, x_2]$
   (d) $u(x_1, x_2) = x_1 + x_2^2$

2. Mr. Pep Iola enjoys goods X (football matches) and Y (wine). His satisfaction can be modeled with the following utility function:

$$U = X^{0.5}Y^{0.5},$$

   in which X and Y stand for the quantity of the goods.

   (a) Derive the analytical expression of the indifference curves associated to $U = 10$ and $U = 20$;
   (b) Draw the indifference curves, comment upon their relative position in the graph.
   (c) Show the equations representing the marginal utility for X and for Y.
   (d) Calculate the marginal rate of substitution (MRS) when $U = 10$ and $X = 2$ and $X = 4$. Show that the MRS is always a decreasing function of the consumption of the good.
   (e) Compare the values obtained for the MRS along the indifference curve. What does it mean?

3. Lady Gogo earns a monthly income of €500 and that the price of X (rice) is €5 and the price of Y (beans) €10.

   (a) Draw this consumer's budget constraint.
   (b) Indicate her feasible set.
   (c) Depict the changes in the budget constraint emerging from these events:

  i. income rises to €600;
  ii. price of X rises by 20%;
  iii. price of Y halves;
  iv. doubling of prices of both X and Y;
  v. the consumer is given a gift of 10 units of X

4. Mr. Jeff Bolewski, has a monthly income of €1000. His consumption basket includes food products (X), which price averages €5 per unit, and rugs (Y), averaging €10 per unit. The utility function is given by:

$$U = XY.$$

   (a) What bundle of goods will the consumer choose? What utility will he achieve?
   (b) Make a graphical representation of this optimization challenge.
   (c) If his income rises to €1200 what is new choice? Use the diagram to illustrate.
   (d) What if the price of X increases to €10?

5. Sue consumes only two goods, food and clothing. The marginal utility of the last dollar she spends on food is 12, and the marginal utility of the last dollar she spends on clothing is 9. The price of food is 1.2/unit and the price of clothing is 0.9/unit. Is Sue maximizing her utility? Imagine now that the price of food dropped to 1/unit. Is she now maximizing her utility? If not, consumption of which good should she increase?

6. Paula, a former actress , spends all her income attending plays and movies and likes plays exactly three times as much as she likes movies.

   (a) Draw her indifference map
   (b) Paula earns 120 € a week. If play tickets cost € 12 each and movie tickets cost 4€ each, show her budget line and highest attainable indifference curve. How many plays will she see?
   (c) If play tickets are 12 € and movie tickets are 5€ how many plays will she attend.

7. Diogo budgets 9€ a week for his morning coffee with milk. He likes it only if it is prepared with 4 parts coffee and 1 part milk. Coffee costs 1€/100 gram and milk 0.50€/100 gram. How much coffee and how much milk will Diogo buy per week? How will your answer change if the price of coffee rises to 3.25€? Show our solution graphically.