Microeconomics — class 9

1. Janek has income 10000zł this year 10000zł next year. The interest rate is 10%.

a) What is the present value of his stream of income (assuming, that he obtains money at the beginning of the year).

b) Draw hi budget constraint, assuming that unit of consumption each year costs 1zł.

c) His utility function is $u(C_1, C_2) = C_1^2 \cdot C_2$.

How much is Janek going to consume in each year? Is he a lender or a borrower?

d) How the answer changes if there is inflation, resulting in rise of price of consumption next year to 2zł?

2. Inhabitants of some distant island live only on rice which they cultivate. This year they collected 100 sacks, which they can consume immediately or put to a warehouse as stocks for winter.

There is a plague of rats, which eat half of stocks in the warehouse.

a) How much the islanders will eat immediately and how much in winter, if their utility function is such that the absolute value of marginal rate of substitution C_1 by C_2 is $\frac{C_2}{C_1}$?

b) A merchant ship arrived at the island and noticing the need, the captain offered his cat for sail. The cat is a very skilful hunter and after the transaction rat will eat not more than 10% of stocks. What is the maximal price the islanders are willing to pay for the cat (in sacks of rice)?

3. Staszek has income 10000zł this year and 20000zł next year. The banking system offers two different interest rates: for credits 15% and for savings 5%.

a) What is the present value of his income, assuming that money is obtained always at the beginning of the year). What is the future value?

b) Draw his budget constraint, assuming that a unit of consumption year year costs 1zł.

c) The utility of consumption over time is $u(C_1, C_2) = C_1 \cdot C_2$.

How much is he gonig to consume this year and how much next year? Is he going to be a lender or a borrower?

4. A factory on Malta desalintes sea water for local water-supply. From one litre of sea water they can obtain 0.9 litre of drinking water, and as a by-product of 0.02 kg of salt, which also can be sold. To obtain it, they need electricity. Electric energy consumed in the process of desalination of one ton of water is one unit, and proportionally for other amonunts (if the amount of electric energy used is less then

the amount of water in tons, then the surplus is not desalinated and it returns to the sea).

Write the set $\mathbb{Y}$ assuming free disposal.

5. Comment on and illustrate by calculations the economic truth "the marginal rate of technical substitution of labour by capital is decreasing (be careful!), if the technology is such that, marginal products are posisitive and decreasing and the marginal product of labour is increasing in capital".