Microeconomics I - Seminar #10, April 24, 2009

Problem 1: The product market can be characterized by functions:

inverse demand function: $P = 55 - 0.1Q_D$

supply function: $Q_S = 100P$

and the representative firm has a production function: $q = 70L - L^2$ where L is number of units of labor hired at perfectly competitive labor market with equilibrium wage w=100 CZK.

(a) calculate the product market equilibrium price and quantity (P^*, Q^*)

(b) calculate the optimal number of workers hired by one firm

(c) how many units of q will firm produce in optimum?

(d) what would be the profit/loss of firm in this (ad b) short run optimum?

Problem 2: Intertemporal choice. Ben earns \$110 this year and \$110 the next year. The interest rate in a bank is 10%. Ben's preferences over current and future consumption are represented by the following utility function:

$$U(c, f) = \sqrt{cf}$$

Will Ben save part of his income during the first year or will he take a loan?

Problem 3: Market equilibrium - two markets. Demand functions for two goods are given by:

$$P_1 = 200 - Q_1 + 0.3P_2$$

$$P_2 = 100 - 2Q_2 + 0.5P_1$$

Suppose that the supply is fixed at the level of $Q_1 = 50$ and $Q_2 = 10$. Are these two goods substitutes or complements? What will be the equilibrium prices? Now suppose that Q_1 increases to 71. What will be new equilibrium prices?

Problem 4: Consider the following story from the Second World War. There are two prisoners of war in a German camp: British (consumer A) and French (consumer B). Both of them have a right to get some weekly amount of tea (good 1) and coffee (good 2). British prisoner has the endowment $\omega_A = (1, 4)$ and French prisoner, being privileged, has the endowment $\omega_B = (5, 4)$. The two prisoners are totally separated and the direct exchange is not possible, but they succeeded to persuade a German prisoners' priest to transfer coffee and tee between them. The prisoners' preferences are given by the following utility functions:

$$u^A(x_1^A, x_2^A) = 2\ln x_1^A + x_2^A$$
$$u^B(x_1^B, x_2^B) = 4\ln x_1^B + x_2^B$$

where x_1^i is the amount of good 1 consumer i consumes and x_2^i the amount of good 2. Suppose that the price of good 1 is p_1 and the price of good 2 is p_2.

(a) Sketch the corresponding Edgeworth box. In the Edgeworth box draw several indifference curves of both agents and mark their initial endowment. Find Pareto efficient (Pareto optimal) allocations.

(b) Find the market demand functions x_1^A, x_1^B.

(c) Find the competitive equilibrium (prices and allocations) for this prisoners' economy.

Problem 5: Consider a following two-consumers (A,B) and two-goods (x,y) economy. The utility function of the first consumer is

$$u^A = 2x^A + y^A$$

and his endowment is $\omega^A = (4, 0)$. The second consumer has the following utility function

$$u^B = \min\{x^B, 2y^B\}$$

and endowment $\omega^B = (0, 3)$.

1. Find the competitive equilibrium and graph it in the Edgeworth box.
2. Find Pareto efficient allocations and graph them in the Edgeworth box.