Microeconomics I - Homework - Due Tuesday, April 28, 2009

Homework can be delivered: (1) by email to katarina.kalovcova@cerge-ei.cz or
(2) personally during the seminar or lecture

No later submissions will be accepted.

Problem 1: Suppose, that the utility function is given by:

$$U(x, y) = 5 \ln x + 8 \ln y$$

$$P_x = 5$$

$$P_y = 8$$

(a) Derive equation of Engel's curve for x (Hint: this is something we have done when we were deriving the demand for x with given P_y and income; but here you are looking for function $x = f$(income; at given P_x, P_y)

(b) Depict this curve on the graph as relation between x, I (with x on horizontal and I on vertical axis; find at least 3 points).

(c) What type of good is x - normal or inferior? Prove and explain.

(d) If the answer in part (c) is normal (inferior) sketch a graph for the case of inferior (normal) good.

Problem 2: Intertemporal choice is something we haven't dealt with during our seminars. But, after reading related chapter in any of recommended textbooks, you will find out, that it can be fully described by indifference analysis. Go through it and then solve this problem:

The preference about current and future consumption can be described by utility function:

$$U(c, f) = 11c + 10f$$

where c = current consumption

f = future consumption

We further know that the interest rate is 5% and we have \$100 that can be used either on current or future consumption (or any of their combination)

(a) Depict this situation in indifference system (it means: depict budget line, at least one of IC - with at least three points; mark intersections with axis); what will happen if r changes to 20%? Depict and explain!

(b) Find the optimum combination of future and current consumption (remember, this is strictly analogical problem to our x, y problems, only you have to think about "price of future consumption").

Problem 3: Suppose, production of a firm can be described by function:

$$Q(L, K) = K^{1/3}L^{2/3}$$

(a) Derive the total cost function in a general form with respect to any prices of labor and capital w and r, respectively. (Hint: you gave to go through the optimality conditions and get the function of TC in form $TC = f(w; r; Q)$)

(b) Suppose now, that in short run your K is fixed at level of 1000. How many units of labor do you need to employ to produce Q=1000? For the rest of the problem suppose that $w = 100$ and $r = 100$. What would be the optimal combination of L and K for Q=1000 if you could change both variables (K, L)?

(c) Compare TC necessary to produce $Q = 1000$ in short run and in long run. Explain.