Stockholm University
Department of Economics
Course name: Microeconomics
Course code: EC7110
Examiner: Ann-Sofie Kolm
Number of credits: 7,5 credits
Date of exam: December 6, 2015
Examination time: 3 hours

Write your identification number on each paper and cover sheet (the number stated in the upper right hand corner on your exam cover). Do not write answers to more than one question in the same cover sheet. Explain notations/concepts and symbols. Only legible exams will be marked. No aids are allowed.

The exam consists of 5 questions. One can get 100 points in total. For the grade E 40 points are required, for D 50 points, C 60 points, B 75 points and A 90 points.

Question 1 is a credit question. If you have received 12 credit points on your assignments, then you should not answer question 1. If you have received 8 credit points on your assignments, then you should answer question 1i but not question 1ii and 1iii. If you have received 4 credit points on your assignments, then you should answer question 1i and 1ii but not question 1iii. If you have received no credit points on your assinments, then you should answer all questions.

Credit	**Solve these questions**
0 points	1i, 1ii, 1iii
4 points	1i, 1ii
8 points	1i
12 points	- (don't solve question 1)

If you think that a question is vaguely formulated: specify the conditions used for solving it.

Results will be posted Thursday, December 24, at the latest

Good luck!

Problem 1 (credit question, see above) (12 points) Carefully define the following terms and show formally how they can be derived based on preferences captured by a strictly quasi-concave utility function.

i Expenditure function.

ii Indirect utility function.

iii Slutsky equation.

Problem 2 Assume that consumption takes place in two periods, where c_1 is consumption in period 1, and c_2 is consumption in period 2. The following utility function captures the preferences over consumption in the two periods: $U(c_1, c_2)$, where $U_i > 0$, $i = 1, 2$. The utility function is twice continuously differentiable and strictly quasi-concave. Income in each period is exogenously given by M_1 and M_2. The price on consumption is the same in both periods and normalized to unity. Let A denote the amount the individual borrows or lends in the first period with $A > 0$ for borrowing and $A < 0$ for lending, and let r denote the interest rate. The budget constraint in period 1 is then $c_1 = M_1 + A$, whereas the budget constrain in period 2 is $c_2 = M_2 - A(1 + r)$.

i (6 points) Create the intertemporal budget constraint by eliminating A from the two budget constraints given in the exercise. Provide an intuition for your expression.

ii (6 points) Derive an expression for the slope of the indifference curve (when graphed in a figure with c_1 on the x-axis and c_2 on the y-axis).

iii (6 points) Derive an expression for the slope of the intertemporal buget constraint (when graphed in a figure with c_1 on the x-axis and c_2 on the y-axis).

iv (6 points) Illustrate the intertemporal buget constraint in a figure with c_1 on the x-axis and c_2 on the y-axis. Also, illustrate how an increase in the interest rate (r) affects the budget constraint.

v (6 points) Derive the optimal (utility maximizing) consumption levels, c_1 and c_2, in the two periods.

vi (6 points) Show formally that the first order conditions in **v)** implies that the solution should be such that we have a tangency point between the budget constraint and the indifference curve.

vii (6 points) What happens to consumption in the two periods, and thus to savings, when the interest rate (r) increases? Carefully motivate your answer.

Problem 3 Assume a firm producing a good y with the use of two factors of production z_1 and z_2. The production technology is given by the following production function: $y = \left[\frac{1}{3}\sqrt{z_1} + \frac{2}{3}\sqrt{z_2}\right]^{\delta}$. Let P denote the product price and p_i, $i = 1, 2$, the factor prices.

i (4 points) What values would δ have to take for the elasticity of scale to be smaller than one?

ii (4 points) Define the concept of the expansion path (EP). Derive the EP for this firm.

iii (4 points) How is an inferior input defined? Are any of the inputs in this firm inferior? Motivate your answer.

iii (4 points) Define the Elasticity of Substitution (σ). Provide an economic interpretation of this concept. Determine σ for this firm.

Problem 4 Consider an economy with two goods and two agents. The two individuals' preferences are captured by $u^1(x_1^1, x_2^1)$ and $u^2(x_1^2, x_2^2)$. The utility functions are twice continuously differentiable and strictly quasi-concave. The initial endowments are given by $\bar{x}_1^1 = \bar{x}_2^1 = \bar{x}_1^2 = \bar{x}_2^2 = \bar{x}$. The price on good 1 is denoted p_1 and the price on good 2 is denoted p_2.

i (6 points) Derive the Walrasian equilibrium price, p_2/p_1.

ii (6 points) Show that $p_1 z_1(p_1, p_2, \bar{x}) + p_2 z_2(p_1, p_2, \bar{x}) = 0$, where $z_i(p_1, p_2, \bar{x})$, $i = 1, 2$, is the excess demand. That is, show that Walras law holds.

iii (6 points) Show that market clearing in one market implies that also the other market clears.

Problem 5 Explain shortly the following terms:

i (3 points) First theorem of welfare economics.

ii (3 points) Single crossing.

iii (3 points) Beckers theory of allocation of time.

iv (3 points) Samuelson family welfare function.