Stockholm University
Department of Economics
Course name: Microeconomics
Course code: EC7110
Examiner: Ann-Sofie Kolm
Number of credits: 7,5 credits
Date of exam: October 28, 2016
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 November 21, 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 an individual with preferences given by the following utility function: $U(x_1, x_2)$ where $U_i > 0$, $i = 1, 2$. The utility function is twice continuously differentiable and strictly quasi-concave. The individual's income M is exogenously given. The individual can buy both goods at the given prices, p_1 and p_2.

i (5 points) Show formally how we can derive the individual's Marshallian demand for the two goods solving the maximization problem.

ii (5 points) Show formally how we can derive the individual's Hicksian demand for the two goods solving the minimization problem.

iii (5 points) Discuss under what circumstances the Marshallian demand derived in i) and the Hicksian demand derived in ii) coincide.

iv (5 points) Use the following identity $h_i\left(p_1, p_2, \bar{U}\right) \equiv D_i\left(p_1, p_2, m(p_1, p_2, \bar{U})\right)$ and derive the Slutsky equation.

v (5 points) Use the Slutsky equation and discuss how an increase in p_i affects the Marshallian demand $D_i(p_1, p_2, M)$ through the different terms.

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: $y = \sqrt{\frac{1}{3}\sqrt{z_1} + \frac{2}{3}\sqrt{z_2}}$. Let P denote the product price and p_i, $i = 1, 2$, the factor prices.

i (4 points) Derive the slope of an isoquant.

ii (4 points) Derive the elasticity of scale, E, for the firm.

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

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

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

Problem 4 Consider an economy with two goods and two consumers. 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 (5 points) Derive the Walrasian equilibrium price, p_2/p_1.

ii (5 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 (5 points) Show that market clearing in one market implies that also the other market clears.

iv (5 points) Derive the pareto set.

v (5 points) Assume that a social planner with a welfare function given by $SW = W\left(u^1(x_1^1, x_2^1), u^2(x_1^2, x_2^2)\right)$ determines the allocation of the existing goods across the two individuals in a welfare maximizing way. The welfare function increases in each individual's utility. Set up the problem facing the social planner and derive the allocation.

vi (5 points) Show that the allocation chosen in v) belongs to the pareto set.

Problem 5 Assume a profit maximizing firm facing i Cobb-Douglas production technology; $f(N) = N^{\alpha}$, where N is labor, and $\alpha \in (0,1)$. The output price is normalized to unity, i.e., $P = 1$. The firm and the union decides on both the wage, w, and the number of workers to be hired, N, through a bargaining process. This is done so to maximize the Nashproduct given by: $\Omega = [N(w - B)]^{\beta} [f(N) - wN]^{1-\beta}$ where $\beta \in (0,1)$ is the bargaining power of the union, and B is unemployment benefits.

i (3 points) Derive an expression for the slope of the iso-profit curves in wage-employment space ($w - N$-space).

ii (5 points) Show that the bargaining solution implies that union's indifference curve is tangent to the firm's iso-profit curve.

iii (5 points) Derive the number of workers the firm and the union agrees on should be hired.