Stockholm University
Department of Economics
Course name: Microeconomics
Course code: EC7110
Examiner: Ann-Sofie Kolm
Number of credits: 7,5 credits
Date of exam: Sunday, October 29, 2017
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 assignments, 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 Friday November 17, 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 from a cost minimizing firm facing a twice continuously differentiable and strictly quasi-concave production function, $y = f(K, L)$, where K and L denote capital and labour input.

i Conditional demand function.

ii Expenditure function.

iii Expansion path.

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 the goods at the given prices, p_1 and p_2.

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

ii (5 points) Show that the partial cross price derivatives of the Hicksian demand functions are equal, i.e., show that $\frac{\partial h_i(p_1,p_2,\bar{U})}{\partial p_j} = \frac{\partial h_j(p_1,p_2,\bar{U})}{\partial p_i}$.

iii (5 points) Show that the expenditure function is increasing in utility, $\bar{U}$.

iv (5 points) Use the fact that the expenditure function is concave in prices and show that the Hicksian demand function has non-positive slopes.

Problem 3 (12 points) Define the concept of CV and EV. When will CV and EV be equal? Now calculate CV when the price on good 1 falls from 4 to 2, and the Hicksian demand function for good 1 is given by: $h_1 = 400p_1^{-2}$.

Problem 4 Assume a profit maximizing firm producing a good, y, with the use of labour, L, as the only input, taking the input and output prices as given. The production function, $y = f(L)$, is twice continuously differentiable and $f_L > 0, f_{LL} < 0$. Let P and w denote the product price and the wage.

i (4 points) The firm's profit is given by $\pi = Pf(L) - wL$. Derive an expression for the slope of the iso-profit curve in wage employment space (consider w on the y–axis and L on the x-axis).

ii (4 points) Derive the labour demand function.

iii (4 points) Derive the profit function.

iv (4 points) Show how the firm's highest profit defined by the profit function is affected by an increase in P.

v (4 points) Show how the firm's highest profit defined by the profit function is affected by an increase in w.

vi (4 points) Show formally that the profit function is convex in w.

vii (4 points) Show that the profit function is homogenous of degree one in input and output prices.

viii (4 points) Assume a union with the following utility function: $V = L(w - \hat{w}) - \hat{w}\hat{L}$ where $\hat{w}$ denotes the exogenously given unemployment benefits and $\hat{L}$ denotes the exogenously given number of members in the union. Derive an expression for the slope of the union indifference curve in wage employment space (consider w on the y–axis and L on the x-axis).

ix (4 points) Assume now that a union and a firm together decide on the wage and on how many workers that should be employed in the firm. When deciding on employment, the solutions they agree on is such that there is a tangency point between the firm's iso-profit curve and the union's indifference curve in wage employment space. Derive the employment determined by the union and the firm from this tangency condition.

Problem 5 Consider an economy with n agents and two goods. The n individuals' preferences are captured by $u^i(x_1^i, x_2^i) = (x_1^i)^{\varphi_i}(x_2^i)^{1-\varphi_i}$, $i = 1, ..., n$. The utility functions are twice continuously differentiable and strictly quasi-concave, and the preferences over the two goods differ across individuals as captured by the parameter $\varphi_i \in (0,1)$. The initial endowments are equal across individuals and given by $\bar{x}_1^i = \bar{x}_2^i = 1, i = 1, ..., n$. The price on good 1 is denoted p_1 and the price on good 2 is denoted p_2.

i (8 points) Derive the Walrasian equilibrium relative price, $\frac{p_2}{p_1}$.

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

iii (6 points) Show that market clearing in all markets except one market implies that also that market clears.