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 10, 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 30 December, 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 Slutsky equation.

ii Indirect utility function.

iii Expenditure function.

Problem 2 Assume an individual with preferences given by the following utility function: $u(c,h) = \ln c - \frac{h^{1+\delta}}{1+\delta}$, where h is hours of work and δ is a positive parameter (Total time (t) is allocated between leisure (l) and market work (h) as $t = l + h$). Consumption, c, depends on taxes paid and is given by $c = wh - T(wh)$ where $T(wh)$ is a non-linear tax schedule and w denotes the hourly wage. There is no exogenous income and all functions are differentiable. Assume interior solutions and that the second order conditions hold.

i (6 points) Derive an expression for the slope of the indifference curve in consumption (c) and work hour (h) space. Also, show that the indifference curves are convex.

ii (6 points) Derive the slope of the iso-expenditure curve in consumption (c) and work hour (h) space. What requirement is needed for the tax schedule in order for the iso-expenditure curves to be positively sloped?

iii (6 points) What requirement is needed for the tax schedule in order for the iso-expenditure curves derived in ii) to be concave in consumption (c) and work hour (h) space?

iv (6 points) Show that the first order condition(s) implies that we have a tangency point between the budget line and the indifference curve in consumption (c) and work hour (h) space.

v (6 points) Derive the labour supply and discuss how changes in the tax system are likely to affect the labour supply.

Problem 3 (20 p) Consider a firm with the following profit function: $\pi^* = \frac{P^4}{p_1^2 p_2}$, where P is the output price and p_1 and p_2 are the input prices.

i (4 points) Derive the firm's demand for the two inputs, z_1 and z_2.

ii (4 points) Derive the firm's production level.

iii (4 points) Show that the profit function is convex in P.

iv (4 points) Show that the profit function is convex in p_1.

v (4 points) Show that the profit function is linear homogenous in prices.

Problem 4

i (4 points) State the 'first theorem of welfare economics'.

ii (9 points) Prove the 'first theorem of welfare economics' by use of contradiction.

Problem 5 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 total amount of good 1 available in the economy is 2, and the total amount of good 2 available in the economy is 4.

i (5 points) Derive the pareto set.

ii (5 points) Assume that a social planner with a welfare function given by $SW = W(u^1(x_1^1, x_2^1), u^2(x_1^2, x_2^2))$ 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.

iii (5 points) Show that the allocation chosen in ii) belongs to the pareto set.

iv (5 points) Now assume that a social planner has the following welfare function $SW = \alpha u^1 (x_1^1, x_2^1) + (1 - \alpha) u^2 (x_1^2, x_2^2)$, where $\alpha \in (0, 1)$, and $u^i (x_1^i, x_2^i) = \ln x_1^i + \ln x_2^i$, $i = 1, 2$. Set up the problem facing the welfare maximizing social planner and derive the allocation of goods.

v (5 points) What happens to the allocation of goods if α increases? Explain why. Moreover, what choice of α is required for the the social planner to allocate an equal amount of good 1 to both individuals? Explain why.