



**Stockholm  
University**

Department of Economics

**Course name:** Intermediate Microeconomics  
**Course code:** EC2101  
**Semester:** Spring 2015  
**Type of exam:** MAIN  
**Examiner:** Jonas Vlachos  
**Number of credits:** 7,5 credits (hp)  
**Date of exam:** Sunday March 22  
**Examination time:** 5 hours (09:00-14:00)

**Write your identification number on each paper and cover sheet (the number stated in the upper right hand corner on your exam cover).**

**Use one cover sheet per question.** Explain notions/concepts and symbols. If you think that a question is vaguely formulated, specify the conditions used for solving it. Only legible exams will be marked. **No aids are allowed.**

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The exam consists of 5 questions and the total number of points is 100. For the grade E 45 points are required, for D 50 points, C 60 points, B 75 points and A 90 points.

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Your results will be made available on your "My Studies" account ([www.mitt.su.se](http://www.mitt.su.se)) on April 10 at the latest.

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**Good luck!**

**Please answer all questions in English!**

**0. Special credit question (1)**

How many hours did you spend working on this course?

### 1. Consumption (25). Please answer in English!

Consider a consumer with the Cobb-Douglas utility function  $U(q_1, q_2) = \sqrt{q_1 q_2}$ , where  $q_1$  and  $q_2$  are the quantities of goods 1 and 2 consumed, respectively. This consumer has an income denoted by  $Y$  which is devoted to goods 1 and 2. The prices of goods 1 and 2 are denoted  $p_1$  and  $p_2$ .

- a) What is this consumer's MRS as functions of  $q_1$  and  $q_2$ ?
- b) Write out the Lagrangian for the consumer's utility maximization problem.
- c) Using the Lagrangian method, derive the consumer's demand equations for both goods as functions of the variables  $p_1$ ,  $p_2$ , and  $Y$ .
- d) Give the intuition for why  $MRS=MRT$  when consumers maximize their utility.
- e) Give an intuitive interpretation of the Lagrange multiplier in the above problem.
- f) For most goods, the demand falls if prices increase but this must not always be the case. Using what you have learned about consumer theory, explain intuitively (with or without graphs) how it can be that consumption of a good increases when the price of the good increases. Under what conditions is this more likely to happen? (Note that the answer to this problem is not related to the above solution.)

## 2. Production (25). Please answer in English!

This question asks you to determine the effect of a tax on labor on the long-run cost function. Consider a firm with the production function  $f(L,K) = LK$ . The wage rate and rental rate on capital are  $w$  and  $r$ , respectively.

- a) Using the Lagrangian, derive the long-run cost function for this firm.
- b) Suppose the government taxes labor at by an amount  $t$  per unit of labor. Rewrite the long-run cost function including the tax..
- c) Compute the marginal effect of the tax on the long-run cost function. To do so, compute the partial derivative of the cost function with respect to  $t$ . Does an increase in the tax increase the cost linearly? Briefly explain why or why not.
- d) Provide a brief explanation for the “last dollar rule” for cost minimization. If the firm is producing at a point where the isocost line is *steeper* than the isoquant, what does the last dollar rule imply (i.e., where is the last dollar most productive, L or K) and how should the firm alter its capital and labor in the long run?

### 3. Externalities (25). Please answer in English!

Suppose the government wishes to regulate mercury emissions of factories in a specific industry by either setting an emissions standard (ie a quantity restriction) or imposing an emissions fee (per ton of mercury). The government is uncertain as to the marginal abatement costs (ie, the marginal costs of reducing pollution), which may be high ( $MC_1$ ) or low ( $MC_2$ ).

$$MC_1 = 15M + 500$$

$$MC_2 = 15M - 500$$

where  $M$  is the units of mercury abated. The government believes there is a 50% chance of each of the marginal abatement costs. The marginal benefit of abatement is known to be:

$$MB = 1500 - 10M$$

- a. What is the optimal level of emissions for each of the cost curves above?
- b. State the expression for the expected marginal abatement cost?
- c. What is the optimal emissions standard according to the expected abatement costs?
- d. What is the optimal abatement fee according to the expected abatement costs?
- e. Which regulation (optimal quantity regulation or optimal emissions fee imposition) will result in a lower deadweight loss (DWL) in the presence of the uncertainty? Explicitly compute the expected DWL arising from each proposal (approximate answers where you round the numbers are ok).

#### 4. Shorter questions (24). Please answer in English!

a) Prison inmates Alex and Piper are former lovers and former drug dealers. While in prison, they are forced to testify against the head of the drug cartel that they used to be working for. If both of them break the loyalty towards their former boss and tell the truth, they will both get a slight reduction in the sentence that they are serving. If just one of them tells the truth while the other one is silent, the one who tells the truth will be released from jail while the other one will go on serving the original sentence. If both remain silent, they will both continue serving their original sentence.

a:i) Describe the above scenario in a normal form game and derive the Nash equilibrium (or Nash equilibria).

a:ii) Say that you were Alex and could communicate with Piper before you give your testimony. How would you try to convince Piper to testify?

a:iii) Before they broke up with each other, they really enjoyed each other's company. In fact, they found it pointless doing anything without the company of the other. This said, Alex and Piper did not have exactly the same preferences. Alex had a special fondness for dancing, while Piper preferred going to spas. Describe this scenario in a normal form game and derive the Nash equilibrium (or Nash equilibria)

b) Assume for simplicity that the consumer price index (CPI) used to derive measures of inflation is constructed in the following way: Data on prices and quantities of essentially all goods are collected in some base year (say 2010). Then prices of the same goods are collected again in a subsequent year (say 2015) and the cost of consuming the original (2010) bundle of goods is calculated. The change in the CPI is then the change in the cost of buying the original bundle. If we assume that there are only two goods,  $X$  and  $Y$ , show mathematically how to derive the rate of inflation using the CPI. If we are interested in the true cost of living, what are the potential biases in using this as a measure of inflation?

c) Say that you live in a country where health care insurance is privately provided. What would you expect to happen if people, but not insurance companies are given the opportunity to test for genetic diseases? Briefly discuss ways of dealing with the potential problems that may arise. Are you aware of empirical evidence suggesting that problems may indeed arise?

d) Ceasar is a fan of the popular band Kayser and tries to see their concerts on every tour they make. Ceasar is also quite poor but his concert going has been facilitated by Kayser's pricing strategy; Kayser sells their tickets cheaply and their concerts (almost) always sell out. When Ceasar (who is in his 40's) started going to Kayser's concerts, there essentially was no secondhand market for their tickets. However, with the development of the internet, it is now easy to auction off a ticket way above the price that Kayser asks for for it. Is Ceasar better or worse off due to the development of an active secondhand market for Kayser's tickets?