



Stockholm  
University

Department of Economics

**Course name:** Intermediate Microeconomics  
**Course code:** EC2101  
**Type of exam:** Main  
**Examiner:** Lars Vahtrik  
**Number of credits:** 7,5 credits  
**Date of exam:** Thursday 26 October 2017  
**Examination time:** 5 hours (9:00-14:00)

**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.** You may answer in English or in Swedish.

---

The exam consists of 5 questions. Questions 1-3 are worth 25 points each, question 4 is worth 15 points and question 5 is worth 10 points. The maximum score on the exam is 100 points in total. For the grade E 45 points are required, for D 50 points, C 60 points, B 75 points and A 90 points.  
If you have the course credit you do not answer question 5.

---

Your results will be made available on your "My Studies" account ([www.mitt.su.se](http://www.mitt.su.se)) on Thursday November 16 at the latest.

---

**Good luck!**

### Question 1

Mary has the utility function  $U(x_1, x_2) = x_1^{1/4}x_2^{3/4}$ .

- a) Set up the Lagrangian and derive an expression for the marginal rate of substitution and calculate the Marshallian demand for both goods.
- b) Assume that the initial price of  $x_1$  is given by  $p_1^0 = 4$  and the initial income is given by  $M^0 = 160$ . Now assume that the price of  $x_1$  increases to  $p_1^1 = 5$ . Calculate the income effect and the substitution effect based on the Slutsky equation and explain the logic behind your calculations. Discuss if  $x_1$  is a normal good or an inferior good to Mary.
- c) Draw a graph that is consistent with your solution and illustrate the total effect, the substitution effect and the income effect in that graph. Discuss if your findings will tend to "understate" or "overstate" the income effect with the help of your graph. **(25P)**

### Question 2

Consider a market with two firms where the inverse demand function is given by  $p = 28 - 2q$  and where  $q = q_1 + q_2$ . Each firm has the total cost function  $c(q_i) = 4q_i$ , where  $i = \{1, 2\}$ .

- a) Compare price level, quantities and profits in this market calculating the Cournot equilibrium and the Stackelberg equilibrium. Draw a graph with best response functions and illustrate the Cournot and Stackelberg solutions in that graph.
- b) Compare your solutions in a) to the outcomes under perfect competition and under collusion (monopoly) and illustrate your additional findings in the graph. **(25P)**

### Question 3

Assume that you have two types of customers in an insurance market. Both types have the same utility function  $U(W) = W^{1/2}$  where  $W$  denotes wealth. The probability of a bad outcome is  $p_A = 1/2$  for type A customers and  $p_B = 1/4$  for type B customers. Assume that the level of wealth in the bad outcome is 10000 and that the level of wealth in the good outcome is 50000.

- a) Derive the optimal insurance solution assuming that the insurance company acts in a perfectly competitive market under the condition that the risk neutral insurance company can observe the type of each customer. For how much will the customers insure and what will the insurance premium be for each group?
- b) Calculate the insurance premium in a competitive market if the insurance company cannot distinguish between the two groups. Assume that each group consists of half of all customers in this market. Is there a problem with this solution? Explain what will happen in this market. (Hint :  $\sqrt{10000}=100$  ,  $\sqrt{35000} \approx 187$  ,  $\sqrt{50000} \approx 224$  )

**(25P)**

#### Question 4

Assume that the production function is given by  $f(x_1, x_2) = x_1^{1/2} x_2^{1/2}$

- a) Calculate the return to scale of this technology.
- b) Calculate the technical rate of substitution by setting up the Lagrangian and draw a graph illustrating the solution. Calculate the conditional factor demands.

**(15P)**

#### Question 5

If you have the course credit, do not answer this question.

Calculate the cost function corresponding to the production function given in question 4. What can you say about marginal cost and average cost? Explain the connection between your findings and the production technology.

**(10P)**