



Stockholm  
University

Department of Economics

**Course name:** Intermediate Microeconomics  
**Course code:** EC2101  
**Type of exam:** Retake  
**Examiner:** Adam Jacobsson  
**Number of credits:** 7,5 credits  
**Date of exam:** Saturday 29 April 2017  
**Examination time:** 5 hours (09:00-14:00)

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

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.

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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.

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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 22 May at the latest.

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**Good luck!**

### Question 1

Hillary and Donald have the following initial endowments of apples (A) and oranges (O):

$$\overline{A}_H = 6, \overline{O}_H = 4, \quad \overline{A}_D = 4, \overline{O}_D = 6$$

Hillary's preferences are represented by the following utility function:

$$u_H(A_H, O_H) = 5\sqrt{A_H O_H}.$$

Donald's preferences are represented by this utility function:  $u_D(A_D, O_D) = \sqrt{A_D O_D}$ .

- Draw an Edgeworth box diagram with Hillary in the lower-left corner and Donald in the upper-right corner, where consumption of oranges is measured on the horizontal axis and consumption of apples is measured on the vertical axis. Identify the initial endowments and draw the indifference curves of Hillary and Donald consistent with these endowments. (5 points)
- Calculate a competitive equilibrium when Hillary and Donald decide to trade with each other. Let  $p_A$  and  $p_O$  denote the prices of apples and oranges respectively. That is, what are the equilibrium prices and final allocation of apples and oranges? (15 points)
- Show graphically the Pareto dominating space given the initial endowments and show that the competitive equilibrium is Pareto-efficient. (5 points)

### Question 2

Consider the firm ACME which uses capital,  $K$ , and labour,  $L$ , to produce widgets according to the following production function:  $f(K, L) = K^{\frac{1}{3}}L^{\frac{1}{3}}$ . Let  $r$  and  $w$  be the prices of capital and labour respectively.  $P$  is the price of widgets. The markets for widgets, capital and labour are all perfectly competitive.

- What is the technical rate of substitution between capital and labour for ACME? (5 points)

In the short run, the level of capital is fixed at  $K = \bar{K}$ .

- Set up the short run profit maximization problem. Calculate the short run optimal level of labour. (5 points)

In the long run, ACME can vary both  $K$  and  $L$ .

- Set up ACME's long run cost minimization problem and solve it by using the Lagrange method. (Hint: fix output at the level  $\bar{y}$ .) What are the cost minimizing levels of  $K$  and  $L$  in the long run? (10 points)
- Derive ACME's long run cost function (hint: use your answer from c). (5 points)

### Question 3

Consider a market for a homogenous good with the following inverse demand function:  $p(y) = 20 - 2y$  where  $y$  is total sold quantity of the good on the market and  $p(y)$  is the price for which it sells for. There are only two firms on this market, Alpha and Beta, who both produce this homogenous good. Alpha's cost function is  $c_A(y_A) = 2y_A$  and Beta's cost function is  $c_B(y_B) = 4y_B$ . The two firms set their production quantities simultaneously

without knowing the choice of their opponent, but both firms know the inverse demand function and each other's cost functions.

- a) Derive both firms' best response functions and draw these in a diagram. (10 points)
- b) What quantities will each firm produce in the equilibrium? Illustrate these quantities in the diagram from a). What is the total quantity produced and what is the equilibrium price? (It is ok to answer using fractions).

(8 points)

Now assume that firm Alpha sets its quantity before Beta.

- c) What quantities will the firms produce in the new equilibrium? Give an intuitive explanation for why the total quantity produced has changed (if there is a change) (It is ok to answer using fractions).

(7 points)

#### Question 4

After a car crash Mr Magoo wants to buy a used car. Just like all other buyers of used cars on the perfectly competitive market he is willing to pay 20000 SEK for a lemon (a bad used car) and 50000 SEK for a plum (a nice used car). The sellers are prepared to sell lemons for a minimum of 10000 SEK and plums for 40000 SEK. The buyers cannot distinguish the lemons from the plums when purchasing a car while the sellers know what they are selling. The buyers' and the sellers' valuations of the cars are common knowledge.

- a) Assuming that the proportion of lemon cars is 10% (the buyers know this), what would the market equilibrium price for a used car be? Is the market outcome efficient? Explain! (4 points)
- b) Assume now that the proportion of lemon cars is 50% (the buyers know this), what would the market equilibrium price be for a used car? Is the market outcome efficient? Explain! (4 points)
- c) Can you give an example of how sellers of plums might convince buyers that they are actually selling a plum? Explain! (4 points)
- d) If the buyers actually could distinguish lemons from plums, what would the market price be for each type of car? Would this be an efficient market outcome?

(3 points)

#### Question 5

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

- a) A monopolist faces the inverse demand function  $p(y) = 10 - y$ , where  $p$  denotes price and  $y$  denotes quantity. The cost function is given by  $c(y) = 2y$ . Set up the monopolist's optimization problem and derive the quantity that the monopolist will supply. What will be the market price? (3 points)
- b) Explain the conditions that must hold for a good to be called:
  - I. A normal good.
  - II. An inferior good.
  - III. An ordinary good.
  - IV. A Giffen good.(4 points)
- c) A common phenomenon is third-degree price discrimination. Explain how a monopolist behaves in such a setting. Also, explain how the price elasticities in the different consumer groups affect the pricing decision by the monopolist. (3 points)