Version: A

Repeat exam in Microeconomics A
Spring Term 2011

Handling of the exam

- Please check carefully whether your exam sheets are complete and correct, objections after the exam cannot be considered:
  - There are 2 **versions** of this exam, which are denoted by A and C respectively. Please check carefully, whether the version on the question sheet corresponds to the one on the solution sheet.
  - The **question sheet** (including the pages with the general remarks) consists of 8 pages. In addition there is a **solution sheet**, which consists of 3 pages.
- The use of resources other than a non-programmable calculator and at most one dictionary is not allowed. The use of other resources (e.g. programmable calculators, your own concept paper) leads to the disqualification from the exam.
- You have 120 minutes to solve the exam.
- The **exam** consists of 5 True- / False questions, each consisting of 5 subquestions, and 3 Text Problems again each consisting of 5 subquestions.
- For the True- / False- questions you have to decide whether a statement is true or false. For *each* subquestion you have to mark on the solution sheet whether the statement is true (T) or false (F). You will be awarded points according to the following rule: If your answer is correct, you will obtain *3 points* per statement. If your answer is wrong or if both answers are marked, you will obtain *0 points*. If no answer is given, then you will get *1 point*. For the True- / False- questions you can therefore obtain at most obtain 75 points.
- The **Text Problems** have, on the one hand, Multiple-Choice-subquestions (MC) with 5 answers provided for each question, where *exactly one of these answers is correct*. On the other hand, there are numerical subquestions (N), where you have to fill in a number on the solution sheet in encoded form. For each subquestion you get 5 points if answered correctly and 0 otherwise. For the Text Problems you can therefore at most obtain 75 points. Here is an example on how to encode integers in the numerical subquestions: Suppose the solution to the question is **503**. Then this number has to be filled in as follows:

[Example]

Important: Mark the zero in the first column if the solution is a two-digit number. Similarly, mark the zero in the first and in the second column if the solution is a single-digit number.

- You will have passed the exam with certainty, if you obtain at least *70 points* or if you are among the 75% best participants of the exam.

Handling of the solution sheet:

- You **only** have to hand in the solution sheet at the end of the exam. Answers on concept sheets or on the question sheet will not be considered. We recommend that you fill in the solutions at the **end of the exam** in order to avoid corrections. Please start to fill in your answers **at least 5 minutes before the end of the exam**. The supervisors have orders to collect the solution sheets, even if you have not yet filled in your answers.
- *Please fill in the whole circle, do not mark answers with a cross!* Only *unambiguously legible* solutions can yield points. Please do not use TippEx to correct your answers!
- You must sign your solution sheet at the bottom, otherwise your exam is not **valid**.
- If you do not wish that we publish your registration number, your points and your expected mark on our homepage, you have to mark the respective field on the solution sheet. If you mark this field, you have to wait for your grade until it is announced by the "Studienbüro", which may take some time.

Concerning the content of the exam

1. Assume that the "Ceteris-Paribus" condition holds. This means that all variables that are not explicitly changed remain constant. If we ask for example about the effects of the change of one variable (e.g. p_1), you have to assume that the other variables (e.g. p_2) remain constant, unless explicitly stated otherwise.
2. If we say that a variable (e.g. p_1) is changed, we mean a marginal change that is strictly different from zero, unless explicitly stated otherwise.
3. Assume infinitely divisible goods, unless explicitly stated otherwise.
4. Assume strictly positive and finite prices and income.

5. Assume that consumers maximize their utility and firms maximize profit.
6. Market demand functions are always weakly decreasing, market supply functions are weakly increasing.

Good luck!

1 True-/False questions

1.1 Which of the following statements are true?

a If a technology exhibits increasing returns to scale, then the short-run average costs are strictly decreasing in output.

b Economies of scale imply decreasing long-run average costs.

c If a firm maximizes profit and owns a technology with constant returns to scale everywhere, then the firm has no cheaper way to double output than to double all inputs.

d A technology with the production function $f(x_1, x_2) = \min(x_1, \frac{1}{2}x_2)$ exhibits constant returns to scale.

e Assume that a firm X owns a technology with increasing returns to scale and produces an amount q at costs $C(q)$. Assume now that there are two firms Y and Z which both have the same technology as firm X. Statement: If each of the two firms Y and Z produces exactly $\frac{q}{2}$ units, then the sum of the costs that accrue to firms Y and Z is greater than $C(q)$, i.e., $C(\frac{q}{2}) + C(\frac{q}{2}) > C(q)$.

1.2 Which of the following statements are true?

a A firm that operates in a competitive market sets the price for its output such that it maximizes profit.

b The welfare maximizing allocation in a competitive market is always Pareto efficient.

c Assume in this sub-problem that the government introduces a quantity tax in the market. Statement: The higher the quantity tax, the higher the tax revenue.

d The time horizon in this sub-problem refers to the number of firms in the market. Statement: The firms in a competitive market have a strictly lower profit in the long-run market equilibrium than in the short-run.

e Assume in this sub-problem that due to technological progress the production costs for each unit and for each firm are reduced by an amount K. Statement: The price that consumers have to pay in the new equilibrium decreases by K compared to the old equilibrium.

1.3 Consider a village that exists for two periods and consumes only corn. Corn can be stored, but 20% of the stored corn perishes between the periods and has to be thrown away. The harvest yields 500 kg of corn in each period. The preferences of the village are given by $u(x_1, c_2) = c_1^2 c_2$, where c_1 denotes consumption of corn in the first period and c_2 denotes consumption of corn in the second period, both measured in kg. The village does not have any monetary income. Which of the following statements are true?

a If the village has no connection to the rest of the world, it consumes the same amount of corn in both periods.

b If in each period the village can buy and sell corn at a market price of p per kg (but it cannot borrow or lend), it consumes the same amount of corn in both periods.

c If in each period the village can buy and sell corn at a market price of p per kg as well as borrow and lend at an interest rate of $r = 10\%$, it consumes the same amount of corn in both periods.

d Suppose that the village can sell corn at a price of p^s and buy corn at a price p^b in each period as well as borrow and lend at an interest rate of $r \geq 0$. Suppose further that the village consumes $c_1 \in (0, 500)$ in period 1. Statement: The village can consume at most $c_2 = \frac{(500-c_1)p^s(1+r)}{p^b} + 500$ in period 2.

e If instead of $u(c_1, c_2) = c_1^2 c_2$ the village maximized the utility function $\tilde{u}(c_1, c_2) = \ln c_1 + \frac{1}{2} \ln c_2$, it would make the same choices.

1.4 Kitty and Mona buy only comics (good 1) and key chains (good 2). Their preferences over these goods are monotonic. In Kitty's town, comics cost 4 Euro each while key chains cost 6 Euro each. Kitty buys the bundle (6,6). Where Mona lives, the price of comics is 6 Euro while the price of key chains is 3 Euro, and Mona chooses the bundle (10,0). If prices change in Mona's city to (8,2), then she chooses (6,6). Which of the following statements are true?

a Kitty is better off with the prices in her city than facing the prices (6,3) in Mona's city.

b There is not enough information to decide whether Mona and Kitty have the same preferences.

c Mona's choices violate the weak axiom of revealed preference.

d Mona weakly prefers the bundle (10,0) to the bundle (6,6).

e Kitty strictly prefers the bundle (7,5) to the bundle (6,6).

1.5 Assume that a consumer's preferences over two goods are monotonic and can be represented by a strictly concave and differentiable utility function u. Which of the following statements are true?

a If $u(x) = u(y)$, then x and y are on the same indifference curve.

b If an indifference curve of the consumer is described by the function $x_2(x_1)$, then any positive monotone transformation of $x_2(x_1)$ also describes an indifference curve of the consumer.

c If an indifference curve of the consumer is described by the function $x_2(x_1)$, then the second derivative of this function is greater than zero, i.e., $x_2''(x_1) \geq 0$.

d The utility function $\sqrt{u}$ leads to the same marginal rate of substitution and the same marginal utility as u.

e If in the bundle $x = (x_1, x_2)$ at least one quantity is positive, for example $x_1 > 0$, then $u(x) > 0$.

2 Text Problems

Problem 2.1 Consider a market with n firms. Each of these firms has the same supply function $q^s(p) = \frac{1}{5}p$. Suppose that there are no fixed costs. The market demand is given by $Q^d = 8 - 2p$.

2.1.1 (N) Compute the quantity that is traded in the market equilibrium if $n = 10$. State the resulting number rounded to the nearest integer.

2.1.2 (N) Compute the sum of the profits of all firms in the market equilibrium if $n = 10$. State the resulting number rounded to the nearest integer.

2.1.3 (N) Assume in this sub-problem that $n = 10$ and that the government introduces a quantity tax of $t = 2$ which is paid by the producers. Compute by how much the consumer surplus is reduced compared to the situation without taxes. State the resulting number rounded to the nearest integer.

2.1.4 (N) Compute the quantity tax t which maximizes the tax revenue if $n = 10$. State the resulting number rounded to the nearest integer.

2.1.5 (N) Assume that the government does not impose taxes. How many firms have to be in the market, i.e., what number does n have to be, such that the consumer surplus is $\frac{9}{4}$? State the resulting number rounded to the nearest integer.

Problem 2.2 Each investor knows that there are three possible states of the economy: there will be a recession with probability 1/3, a boom with probability 1/6, and normal times with probability 1/2. There are two possible investments, shares of firm x and shares of firm y. A share of firm x costs 15 and has a value of 27 in a boom and 27 in normal times, and 0 in a recession. A share of y costs 15 and has a value of 15 in normal times, 63 in a boom, and 0 in a recession. The information about the net value (= value - price) of the shares is summarized in the following table.

	boom	normal times	recession
probability of occurence	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{3}$
net value of x	12	12	-15
net value of y	48	0	-15

2.2.1 (N) Consider a random variable $z = y - x$. What is the expected value of z, rounded to the nearest integer?

2.2.2 (N) Consider a random variable $z = y - x$. What is the variance of z, rounded to the nearest integer?

2.2.3 (N) Assume that investor A has initial wealth $Y_0 = 4200$ and buys 250 shares of y. What is his total wealth in a recession? State the result rounded to the nearest integer.

2.2.4 (N) Assume that investor B has initial wealth $Y_0 = 4200$ and she has the utility function $U(Y) = \sqrt{Y}$ over money. Assume in this sub-problem that she can only buy shares of firm x. How many shares of x does she buy in order to maximize her expected utility? State the result rounded to the nearest integer.

2.2.5 (MC) Assume now that investor C with the initial wealth $Y_0 = 4200$ and the utility function $U(Y) = \sqrt{Y}$ wants to invest exactly 1500 Euro, but this time she can invest in both firms. Exactly one of the following statements is true.

a Investor C buys 100 shares of x.

b Investor C buys 20 shares of x and 20 shares of y.

c Investor C buys 50 shares of x and 50 shares of y.

d Investor C buys 100 shares of y.

e None of the above four statements is true.

Problem 2.3 There are two types of producers in the market for Schokowuppis in Mannheim. Type X producers can produce with the cost function

$$C_X(q) = 4q^2 + 4$$

and type Y producers have the cost function

$$C_Y(q) = 2q^2 + 8$$

where q is the quantity of Schokowuppis per year (in thousand). There are 40 producers of type X and 20 producers of type Y. The producers operate in a competitive market and the market price for one Schokowuppi is p.

2.3.1 (MC) Exactly one of the following answers is correct.

a If producers of type X produce strictly positive amounts, then it is possible that producers of type Y produce nothing.

b If producers of type Y produce strictly positive amounts, then it is possible that producers of type X produce nothing.

c At a price of $p = 2$ producers of type X and type Y will both produce strictly positive amounts.

d For $p > 8$ producers of type X will always produce strictly more (per firm) than producers of type Y.

e None of the above four statements is correct.

2.3.2 (N) Compute the aggregate supply of Schokowuppis at a price of $p = 12$. State the result rounded to the nearest integer.

2.3.3 (N) Compute the sum of all profits at a price of $p = 12$. State the result rounded to the nearest integer.

2.3.4 (N) Compute the total producer surplus if the price is $p = 12$. State the result rounded to the nearest integer.

2.3.5 (N) In this sub-problem, consider a firm of type X that is active in the market, and assume that $p = 4$ in the current year. How much is the owner of the firm willing to pay not to be the owner of the firm for this year? State the result rounded to the nearest integer.