Version: A

Examination in Microeconomics A
Spring Term 2013 (2nd Exam)

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 7 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 4 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 or similar if you could answer the question with Yes (true) or No (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 60 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 obtain at most 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 in Figure 1:

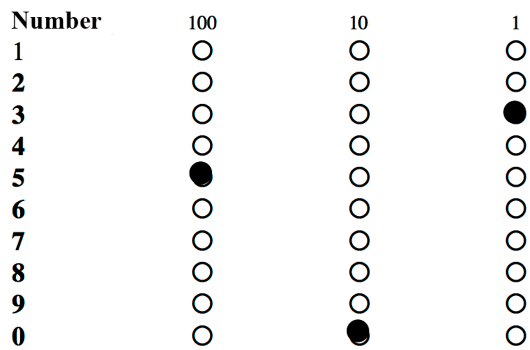

Figure 1:

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! In the case that a circle was already filled in, but then you want to give no answer, first fill in another circle and then cross out both circles (see examples). Please use dark colors (black or blue) and no pencil.

- Example 1: The answer is supposed to be T, answer F was filled in. Then in the end the solution sheet has to look like this:

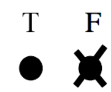

Figure 2:

- Example 2: There is supposed to be no answer, but answer F was filled in. In this case, answer T has to be filled in as well and then crossed out:

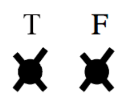

Figure 3:

- You must sign your solution sheet at the bottom.
- If you do not wish that we publish your registration number 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. Assume infinitely divisible goods, unless explicitly stated otherwise.
3. Assume strictly positive and finite prices and income.
4. Assume that consumers maximize their utility and firms maximize profit.
5. If necessary, state your result rounded to the nearest integer.

Good Luck!

1 True-/ False questions

1.1 Lisa has preferences over bundles (x_1, x_2) that consist of a (infinitely divisible) quantity $x_1 \geq 0$ of good 1 (coffee, measured in cups) and a (infinitely divisible) quantity $x_2 \geq 0$ of good 2 (sugar, measured in small spoons). She always drinks coffee with exactly 2 small spoons of sugar per cup. The more coffee she drinks, the higher is her utility. She discards any remaining quantities of good 1 and good 2.

1. Does the utility function $u(x_1, x_2) = \min\{6x_1, 3x_2\}$ represent Lisa's preferences?

2. Does the utility function $u(x_1, x_2) = 2x_1 + x_2$ represent Lisa's preferences?

3. Does the utility function $u(x_1, x_2) = \min\{7x_1, 14x_2\}$ represent Lisa's preferences?

4. Is Lisa's preference relation (weakly) convex?

5. Is Lisa's marginal rate of substitution of good 2 for good 1 at the point $(x_1, x_2) = (2, 2)$ equal to -2?

1.2 Lisa has preferences over bundles (x_1, x_2) that consist of a quantity $x_1 \geq 0$ of good 1 and a quantity x_2 of good 2. Assume that x_2 can take arbitrary values, so that $x_2 \geq 0$ as well as $x_2 < 0$ is possible. Lisa's utility function is $u(x_1, x_2) = (x_1)^{1/23} + x_2$. Lisa has an income of $m > 0$ to spend on goods 1 and 2 having prices $p_1 > 0$ and $p_2 = 1$, respectively. All questions refer to Lisa's optimal consumption bundle (x_1^*, x_2^*).

1. Is $x_2^* = m - p_1 x_1^*$?

2. Can p_1 be such that $\frac{\partial u(x_1^*, x_2^*)/\partial x_1}{p_1} < 1$?

3. Can p_1 be such that $x_1^* = 0$?

4. Is x_1^* strictly increasing in m?

5. Is the demand for good 2 strictly increasing in the price of good 1?

1.3 Consider an exchange economy with two goods, 1 and 2, that may be consumed in arbitrary non-negative quantities. There are many consumers of type A and the same number of consumers of type B. The preferences of each type-A consumer are represented by the utility function $u^A(x_1^A, x_2^A) = x_1^A x_2^A$, where x_i^A denotes the quantity of good $i = 1, 2$ she consumes. Each type-A consumer is initially endowed with $e_1^A > 0$ units of good 1 and $e_2^A > 0$ units of good 2. The preferences of each type-B consumer are represented by the utility function

$u^B(x_1^B, x_2^B) = x_1^B x_2^B$, where x_i^B denotes the quantity of good $i = 1, 2$ she consumes. Each type-B consumer is initially endowed with $e_1^B > 0$ units of good 1 and $e_2^B > 0$ units of good 2. A competitive equilibrium is described by the prices p_1^*, p_2^* of good 1 and good 2, respectively, the bundle consumed by each type-A consumer, (x_1^{A*}, x_2^{A*}), and the bundle consumed by each type-B consumer, (x_1^{B*}, x_2^{B*}).

Assume that $e_1^A + e_1^B = 3(e_2^A + e_2^B)$.

1. Consider the diagonal that connects the corner of the Edgeworth box in which the type-A consumers consume the entire endowment of both goods, $(e_1^A + e_1^B, e_2^A + e_2^B)$, with the corner of the Edgeworth box in which the type-B consumers consume the entire endowment of both goods. Is every point on this diagonal Pareto efficient?

2. Is $3p_1^* = p_2^*$?

3. Is $3x_1^{A*} > x_2^{A*}$?

4. Is $x_1^{A*} + x_1^{B*} > x_2^{A*} + x_2^{B*}$?

5. Is the competitive equilibrium allocation Pareto efficient?

1.4 Consider a competitive market for a single good (partial equilibrium analysis). The market demand quantity for the good is $D(p) = 1/p$ for all prices $p > 0$. The market supply quantity is $S(p) = p$ for all prices $p > 0$.

1. The equilibrium price equals 1.

2. The price elasticity of the market demand equals -1, for all prices $p > 0$.

3. The price elasticity of the market supply equals 1, for all prices $p > 0$.

4. Suppose that a unit tax $t = 1$ is introduced. This changes the competitive equilibrium such that the price paid by the consumers equals $p_D^* = 1.5$, and the price received by the firms after having paid the tax equals $p_S^* = 0.5$.

5. Suppose that a unit tax $t = 0.5$ is introduced. This changes the competitive equilibrium such that the consumers have to pay a price $p_D^* < 1.5$.

2 Text problems

2.1 Mike has an initial wealth of EUR 100. He chooses an investment amount A ($0 \leq A \leq 100$) into a risky asset which returns $(6/5)A$ with probability p, and returns A with probability $1-p$. Mike invests the rest of his wealth, $100-A$, into an asset that returns $(11/10)(100-A)$ for sure. Mike's utility from any amount of money $X > 0$ is $U(X) = lnX$ (recall the derivative $U'(X) = 1/X$). Mike is an expected utility maximizer.

2.1.1 (N) Determine the amount A that Mike invests in the risky asset if $p = 111/220$.

2.1.2 (N) Determine the amount A that Mike invests in the risky asset if $p = 109/220$.

2.1.3 (N) Determine the amount A that Mike invests in the risky asset if $p = 1/2$.

2.1.4 (N) Determine the expected value of Mike's wealth that results from the expected-utility maximizing investment if $p = 1/2$.

2.1.5 (MC) Which of the following statements is true?

a. Mike is risk-neutral.

b. If $p < 1/2$ then Mike invests a strictly positive amount into the risky asset.

c. Mike is risk-loving.

d. Mike is strictly risk-averse.

e. If $p > 1/2$ then Mike does not invest into the risky asset.

2.2 Consider a firm with a technology that is described by the production function $f(x_1, x_2) = x_1 x_2$. Suppose that the prices of the input factors are $p_1 = p_2 = 2$. For problems 2.2.1 to 2.2.4, assume that the firm plans to produce 9 units of output.

2.2.1 (N) Suppose that, in the short run, the level of input factor 1 can be freely chosen while the level of factor 2 is fixed at $\overline{x}_2 = 1$. Determine the firm's short-run cost (that is, the opportunity cost of the short-run production decision plus the cost of buying $\overline{x}_2$ units of input 2).

2.2.2 (N) Determine the firm's optimal choice of x_1 in the long run.

2.2.3 (N) Determine the firm's optimal choice of x_2 in the long run.

2.2.4 (N) Determine the firm's long run production cost.

2.2.5 (MC) Which of the following statements is true?

a. The firm's technology has decreasing returns to scale.

b. The firm's technology has constant returns to scale.

c. The firm's long run average cost function is strictly increasing in the output quantity.

d. The firm's long run average cost function is strictly decreasing in the output quantity.

e. The firm's long run average cost function is constant.

2.3 Consider a market with free entry and exit. Each firm has the same cost function $C(q) = q^3 - 2q^2 + 3q$, where $q \geq 0$ denotes the output quantity produced by the firm. The market demand is given by $D(p) = 20/p$, for all prices $p > 0$.

2.3.1 (N) Calculate the efficient scale of each firm.

2.3.2 (N) Calculate the number of firms that are active in a competitive equilibrium in the long run.

2.3.3 (N) Calculate the long run equilibrium price of the output.

2.3.4 (N) Determine the profit of each firm in the long run equilibrium.

2.3.5 (MC) Which of the following statements is true?

a. If a unit tax $t = 2$ were introduced, then half of the active firms would exit from the market.

b. If 20 firms (but not more than 20 firms) were allowed to be simultaneously active in the market, then the resulting long run equilibrium price would be *larger* than in the long run equilibrium with free entry and exit.

c. If 20 firms (but not more than 20 firms) were allowed to be simultaneously active in the market, then the resulting long run equilibrium price would be *smaller* than in the long run equilibrium with free entry and exit.

d. If 9 firms (but not more than 9 firms) were allowed to be simultaneously active in the market, then no consumer would be worse off than in the long run equilibrium with free entry and exit.

e. If 9 firms (but not more than 9 firms) were allowed to be simultaneously active in the market, then the resulting long run equilibrium quantity would be larger than with free entry and exit.