Examination in Microeconomics A
Spring Term 2012 (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 9 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 obtain 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:

Zahl Frage	100er	10er	1er
1	○	○	○
2	○	○	○
3	○	○	●
4	○	○	○
5	●	○	○
6	○	○	○
7	○	○	○
8	○	○	○
9	○	○	○
0	○	●	○

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 W, but answer F was filled in. Then in the end the solution sheet has to look like this:

W F
● ✖

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

W F
✖ ✖

- 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 grade 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 Consider a competitive market with 100 firms that have the same short run cost function $c(q) = 50 + 0.5q^2$. Which of the following statements are true?

a The firms' short run average variable costs are minimized at $q = 0$.

b The market short run supply curve is given by $S(p) = 100p$.

c At a price $p > 10$, there is a positive output in the market in the long run.

d For this cost function it holds that average total costs are minimized where marginal costs equal average total costs.

e The firms have identical production functions.

1.2 Mr Ekim thinks about insuring farmers against the loss of sheep due to the attack of a wolf. He knows that there are 100 risk-averse farmers who each own 100 sheep. There is one hungry wolf in the county, who in each month eats exactly one of the sheep of the county. The wolf chooses its prey completely at random such that every sheep in the county has the same probability of being eaten by the wolf. If a farmer loses one of his sheep, he buys a new one at a price of 200 euro. Mr Ekim thinks about taking an insurance premium of 2 euro per month and farmer (i.e. 0,02 euro per sheep). If a farmer buys the insurance, he collects 200 euro in case one of his sheep is killed and nothing otherwise. Mr Ekim's utility function over money is given by $U(y) = \sqrt{y}$. Which of the following statements are true?

a The price of 2 euro is the actuarily fair insurance premium.

b The farmers all buy insurance at the price of 2 euro.

c There is not enough information to decide whether a farmer buys insurance at a price of 4.

d Mr Ekim is risk-averse.

e Even if all farmers buy the insurance at the price of 2, Mr Ekim strictly prefers not to offer the insurance.

1.3 Which of the following statements are true?

a The price elasticity of supply is weakly increasing in price.

b Assume that train tickets and gasoline are substitutes in consumption, such that the cross price elasticity of demand is everywhere positive. Statement: If the price of train tickets increases, then demand for gasoline decreases.

c If a quantity tax t is levied on producers, the equilibrium price increases by at most t.

d Consider a competitive market in which market demand is perfectly elastic. Statement: If the government levies a quantity tax on producers, the economic incidence of the tax is fully borne by producers.

e Consider a competitive market in which firms are of two types: One type has cost function $C_1(q) = c_1 q$ but cannot produce more than 1000 units. The other has cost function $C_2(q) = c_2 q$ for any quantity q (in the relevant range), where $c_2 > c_1 > 0$. Then it must hold that in equilibrium, at least one type of firm makes zero profit.

1.4 Which of the following statements are true?

a Every positive monotonic transformation of a money utility function describes the same preferences over risky alternatives as the original money utility function.

b Every positive monotonic transformation of a time-separable utility function describes the same preferences as the original utility function.

c Every positive monotonic transformation of a profit function describes the same preferences as the original profit function. Hint: Here, the preferences are such that a production plan is strictly better than another if and only if it implies a strictly higher profit. If two production plans imply the same profit, then both are seen as equally good.

d Every positive monotonic transformation of a production function describes the same technology as the original production function.

e Every positive monotonic transformation of an expected utility function describes the same preferences as the original expected utility function.

1.5 Consider a competitive market. Assume that the price p' is strictly larger than the price p^* in market equilibrium. The traded quantity at p' is equal to the demanded quantity at p'. The firms in the market all have the same technology. Each firm produces the same output quantity. The quantity, which each firm produces, is produced at minimum costs. The number of firms in the market is fixed. Which of the following statements are true?

a The consumer surplus at price p' is strictly larger than the consumer surplus in the equilibrium.

b The producer surplus at price p' is strictly smaller than the producer surplus in the equilibrium.

c The sum of producer surplus and consumer surplus at price p' is strictly smaller than the sum of producer surplus and consumer surplus in the equilibrium.

d The average costs of production of a firm at price p' are strictly smaller than the average costs of production of a firm in the equilibrium.

e The producer surplus at price p' is strictly larger than the producer surplus in the equilibrium.

2   Text Problems

Problem 2.1 The preferences of two individuals, A and B, are given by:

$$u^A(x_1^A, x_2^A) = \sqrt{x_1^A}\sqrt{x_2^A} \quad \text{and} \quad u^B(x_1^B, x_2^B) = \min(x_1^B, x_2^B)$$

where u^j is the utility of agent j and x_i^j the amount that agent j consumes of good i. The endowments of the agents are:

$$e_1^A = 100, \quad e_2^A = 0$$
$$e_1^B = 0, \quad e_2^B = 100.$$

Both agents view the prices p_1 and p_2 as given.

2.1.1 (N) If goods are traded at prices $p_1 = 1$ and $p_2 = 2$, how much of good 2 does A demand? State this quantity rounded to the nearest integer.

2.1.2 (N) If prices are $p_1 = 1$ and $p_2 = 3$ instead, how much of good 1 does B demand? State this quantity rounded to the nearest integer.

2.1.3 (N) Now consider the two-individual, two-goods exchange economy with individual A and B as described above. Normalize $p_1^* = 1$ and calculate the Walrasian equilibrium price p_2^*. State the equilibrium price rounded to the nearest integer.

2.1.4 (N) How much of good 1 does individual A consume in the Walrasian equilibrium? State this quantity rounded to the nearest integer.

2.1.5 (MC) Think about this exchange economy in an Edgeworth box with individual A in the lower left corner and B in the upper right corner. Exactly one of the following statements is true.

a The contract curve is a straight line.

b A move from one point on the contract curve to another point on the contract curve will make both individuals better off.

c The allocation in which individual A consumes nothing is not an element of the contract curve.

d The endowment is an element of the contract curve.

e None of the above is true.

Problem 2.2 A firm in a competitive market can produce a quantity q of a good using two inputs. The quantities of the inputs 1 and 2 are denoted by x_1 and x_2, respectively. The price of the output is p and the prices for input 1 and 2 are w_1 and w_2, respectively. The following relationship describes the technology of the firm:

$$f(x_1, x_2) = \begin{cases} \sqrt{x_2} \text{ if } x_1 \geq \sqrt{x_2} \\ x_1 \text{ if } x_1 < \sqrt{x_2} \end{cases},$$

where $f(x_1, x_2)$ is the maximum output quantity that can be produced with the corresponding inputs.

2.2.1 (N) Determine the minimum costs of the firm of producing $q = 5$ in case that $w_1 = 20$ and $w_2 = 30$. State the result rounded to the nearest integer.

2.2.2 (N) Determine the output of the firm in case that $p = 60$ and $w_1 = w_2 = 4$. State the result rounded to the nearest integer.

2.2.3 (N) Determine the optimal quantity of input 1 in case that $p = 60$ and $w_1 = w_2 = 4$. State the result rounded to the nearest integer.

2.2.4 (N) Determine the elasticity of supply of the firm in case that $p = 60$, $w_1 = 40$ and $w_2 = 10$. State the result rounded to the nearest integer.

2.2.5 (MC) Exactly one of the following answers is correct, which one?

a If all inputs are multiplied by the factor t (where $t > 1$), then output is multiplied by strictly less than the factor t.

b If all inputs are multiplied by the factor t (where $t > 1$), then output is multiplied by strictly more than the factor t.

c If all inputs are multiplied by the factor t (where $t > 1$), then output is multiplied by exactly the factor t.

d For some (but nor all) input combinations it holds that output doubles if all inputs are doubled.

e None of the above answers is correct.

Aufgabe 2.3 Enna's preferences are represented by the utility function $u(x_1, x_2) = 4\sqrt{x_1} + x_2$. The prices of the two consumption goods are p_1 and p_2. Enna's income is $Y = 100$.

2.3.1 (N) Determine Enna's demand for good 1 at prices $p_1 = 1$ and $p_2 = 1$. State the result rounded to the nearest integer.

2.3.2 (MC) Exactly one of the following statements is true.

a Enna's utility function is a positive monotonic transformation of the utility function $u(x_1, x_2) = \sqrt{x_1} x_2$.

b Enna's demand for good 2 does not depend on Y.

c The indifference curves that describe Enna's preferences are given by the family of functions $x_2(x_1) = (\bar{u} - 4\sqrt{x_1})^2$, where $\bar{u}$ can be any nonnegative real number.

d Good 2 is an inferior good for Enna.

e None of the above is true.

2.3.3 (N) Now the price of good 1 decreases to $\widehat{p}_1 = 1/4$. Calculate the difference between Enna's consumer surplus at the new prices $\widehat{p}_1 = 1/4$ and $p_2 = 1$ and her consumer surplus at the old prices $p_1 = 1$ und $p_2 = 1$. State the result rounded to the nearest integer.

2.3.4 (N) By how much does Enna's income have to be increased at prices $p_1 = 1$ and $p_2 = 1$ such that she is as well off as at income $Y = 100$ and prices $\widehat{p}_1 = 1/4$ and $p_2 = 1$? State the result rounded to the nearest integer.

2.3.5 (N) By how much does Enna's income have to be increased at prices $p_1 = 1$ and $p_2 = 1$ such that she can just afford the optimal bundle at income $Y = 100$ and prices $\widehat{p}_1 = 1/4$ and $p_2 = 1$? State the result rounded to the nearest integer.