Examination in Microeconomics A
Spring Term 2007

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 4 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 100 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	○	●	○

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 *90 points*. The final passing threshold may be below but not above 90 points.

Handling of the solution sheet:

- You **only** have to submit 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 repercussions 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, which 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 An individual has uncertain future wealth of Y_1 (state 1) or Y_2 (state 2). Her preferences over uncertain future wealth can be represented by an expected utility function with money utility U. Which of the following statements are true?

a If the individual is risk-averse and she is offered insurance with an actuarily fair premium, her optimal state-contingent wealth (Y_1^*, Y_2^*) is a point on the 45-degree line in the Y_1-Y_2-diagram.

b The expected utility of a certain (i.e. not uncertain) wealth level is equal to the money utility of this wealth.

c Every positive strictly monotone transformation of the expected utility function represents the same preferences over uncertain future wealth.

d Every positive strictly monotone transformation of U represents the same preferences over uncertain future wealth.

e The shape of the indifference curves in the Y_1-Y_2-diagram does not depend on the probabilities of the two states.

1.2 A firm produces one output using two inputs of which one is fixed in the short run, while the other is variable. Which of the following statements are true?

a For each level of output, long-run marginal costs are (weakly) smaller than short-run marginal costs.

b For each level of output, long-run average costs are (weakly) smaller than short-run average costs.

c If the long-run average cost curve has a minimum, then there is a short-run average cost curve that touches the long-run average cost curve in its minimum.

d The long-run average variable cost curve lies strictly below the long-run average cost curve.

e In the long run, increasing returns to scale imply decreasing average costs.

1.3 A consumer who consumes two goods has the utility function $u(x_1, x_2) = \min(x_1, 2x_2)$. Which of the following statements are true?

a If the prices of the two goods are $p_1 = 2$ and $p_2 = 4$ and the consumer's income is 10, he wants to consume $x_1 = 2.5$.

b The consumer's income expansion path goes through the point $(x_1, x_2) = (4, 2)$.

c The consumer is only interested in the total quantity of both goods consumed.

d The utility function $v(x_1, x_2) = \min(2x_1 + 1, 4x_2 + 1)$ describes the same preferences as the utility function u.

e At the optimum, the consumer's marginal rate of substitution between good 1 and good 2 is equal to $-p_1/p_2$.

1.4 Consider an exchange economy with two goods and two types of consumers. Both types have strictly monotone and strictly convex preferences that are represented by the utility function u^A for the first type and by u^B for the second type. Indifference curves are differentiable and do not intersect the axes. Type A consumers have an endowment of $e^A = (e_1^A, e_2^A)$, type B consumers of $e^B = (e_1^B, e_2^B)$. There are many consumers of both types, and markets are competitive. Which of the following statements are true in equilibrium?

a The marginal rates of substitution between the two goods are equal for all consumers.

b The marginal rates of substitution between the two goods of consumer type A are the inverse of the rates of type B.

c If preferences are not quasi-linear, a competitive equilibrium need not be a Pareto optimum.

d There are always at least two consumers of different type who can be made strictly better off if they trade with each other.

e If consumers of type A destroy a part of their endowment e_1^A before trading, they will be worse off.

1.5 Consider the market for milk, with demand function $D(p)$ and supply function $S(p)$, where p is the market price of milk (per liter). The government introduces a subsidy to support the milk producers. This subsidy is a fixed payment of s per liter of milk sold, paid out to producers. Which of the following statements is true?

a If demand is perfectly elastic, then the subsidy does not change the consumer price.

b If supply is perfectly elastic, then the subsidy does not change the consumer price.

c If supply is unit-elastic, then approximately 50 percent of the subsidy is effectively enjoyed by the consumer.

d After introducing the subsidy, either the consumer price or the equilibrium quantity must change.

e In equilibrium under the subsidy system, the government's total subsidy payment is $s \max(D(p - s), S(p))$, where p is the producer price.

2 Text Problems

Problem 2.1 In the market for pizza delivery in Mannheim, there are two types of producers. Type A can produce with the cost function

$$C_A(q) = 3q^2 + 3$$

and type B with the cost function

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

where q is the number of pizzas per year (in thousand). There are 30 producers of type A and 20 producers of type B. The market is competitive and the market price for a standard pizza is $p > 0$.

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

a At price $p = 2$, producers of type A and of type B will both produce strictly positive quantities.

b If producers of type A produce a strictly positive quantity, then producers of type B may produce zero.

c If producers of type B produce a strictly positive quantity, then producers of type A may produce zero.

d For $p > 0$, producers of type A will always supply strictly more (per firm) than producers of type B.

e None of the above answers is correct.

2.1.2 (N) What is aggregate pizza supply at price $p = 6$? State the answer rounded to integer numbers.

2.1.3 (N) What are total profits at price $p = 6$? State the answer rounded to integer numbers.

2.1.4 (N) What is total producer surplus if the price is $p = 6$? State the value rounded to integer numbers.

2.1.5 (N) If the price is $p = 6$, what is the maximum amount a type A pizza producer is ready to pay per year to acquire the pizza technology of type B (and in turn to give up technology A)?

Problem 2.2 Gretel has an annual income of 20, a house, and savings of 10. Over a given year, with probability 10 percent her house will suffer major damages that would cost half her annual income to repair. Gretel is an expected-utility maximizer with a utility function over money

$$U(Y) = 60Y - Y^2$$

2.2.1 (MC) Exactly one of the following statements is correct.

When considering the wealth levels $Y \in [0, 30]$, Gretel is

a risk averse

b risk neutral

c risk loving

d risk averse for small values of Y and risk loving for large values of Y

e None of the above four answers is correct.

2.2.2 (MC) An insurer offers a property insurance that pays 90 percent of the damage against the payment of a total premium of $x > 0$. Exactly one of the following statements is correct.

a Gretel will never buy insurance because her savings are sufficient to cover the cost of a repair when necessary.

b Gretel will never buy insurance if the insurance is actuarily unfair.

c If the insurance can be bought with reduced coverage (a coverage of $90a$ percent costing xa, for $0 < a < 1$) Gretel will always buy at least some insurance.

d Gretel will always prefer 100 percent insurance to the partial insurance offered by the insurer.

e None of the above four answers is correct.

2.2.3 (N) Calculate the variance of Gretel's wealth in that year (without the insurance) and state it rounded to integer numbers.

2.2.4 (N) Assuming that Gretel does not sell her house and does not buy insurance, calculate her expected utility during the year and state it rounded to integer numbers.

2.2.5 (N) Calculate the risk premium that Gretel is ready to pay in order to avoid the uncertainty related to the house, and state it rounded to integer numbers.

Problem 2.3 Demand and supply in the market for Schokowuppis (a German speciality) are given as follows

$$
\begin{aligned}
S(p) &= 10e^p \\
D(p) &= 10e^{8-p}
\end{aligned}
$$

where p is the market price and e^x is the exponential function (reminder: $e \approx 2.718$). The market is competitive.

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

a If $p > 1$ then supply is (strictly) smaller than demand.

b There is a strictly positive price at which all consumption plans on the market are compatible with all production plans.

c Consider the p-Q diagram (where the quantity Q is on the horizontal axis). For each Q, the surface of the area below the inverse supply function over the interval $[0, Q]$ is equal to the total producer surplus in the market.

d At the price $p = 0$, firms offer a total quantity of 0.

e None of the above four answers is correct.

2.3.2 (N) Determine the price that maximizes welfare on this market and state it rounded to integer numbers.

2.3.3(N) Determine the quantity that is traded in equilibrium in this market and state it rounded to integer numbers.

2.3.4 (N) Determine the price elasticitiy of supply in equilibrium and state it rounded to integer numbers.

2.3.5 (N) Now assume that demand in this market is given by $D(p) = 100 - 2p$ instead of the function stated above. Supply is unchanged as stated above. How many equilibria with a strictly positive price exist now in this market?

Problem 2.4 The preferences of consumer Ule can be represented by the utility function $u(x_1, x_2) = \sqrt{x_1} + x_2$. The prices of the two goods consumed are p_1 and p_2, Ule's income is $Y = 100$.

2.4.1 Determine Ule's demand of good 1 at prices $p_1 = 1/4$ and $p_2 = 1$ and state it rounded to integer numbers

2.4.2 Determine Ule's consumer surplus from good 1 at prices $p_1 = 1/4$ and $p_2 = 1$ and state it rounded to integer numbers.

2.4.3 Now the price of good 1 drops to $\widehat{p}_1 = 1/8$. By how much does the consumer surplus increase compared to the situation in part 1? State the amount rounded to integer numbers.

2.4.4 By how much does one have to reduce Ule's income at prices $\widehat{p}_1 = 1/8, p_2 = 1$ for him to be as well off as at prices $p_1 = 1/4$, $p_2 = 1$ and income 100? State the amount rounded to integer numbers.

2.4.5 By how much does one have to increase Ule's income at prices $p_1 = 1/4$ and $p_2 = 1$ for him to be just able to buy the bundle that is optimal at prices $\widehat{p}_1 = 1/8, p_2 = 1$ and income $Y = 100$? State the amount rounded to integer numbers.