

YLIOPISTOTENTTI - UNIVERSITY EXAM

Opiskelijan nimi / Student name:	Opiskelijanumero / Student number:
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Opintojakson koodi and nimi / The code and the name of the course: 721345S Intermediate Microeconomics	
Tiedekunta / Faculty: Oulun yliopiston kauppakorkeakoulu / Oulu Business School	
Tentin pvm / Date of exam: 23.11.2016	Tentin kesto tunteina / Exam in hours: 3
Tentin nro / No. of the exam: 2nd exam	Opintopistemäärä / Credit units: 6
Tentaattori(t) / Examiner(s): Juha Teirilä	Sisäinen postios. / Internal address: 6 OyKKK
Sallitut apuvälineet / The devices allowed in the exam: <input checked="" type="checkbox"/> Nelilaskin / Standard calculator <input checked="" type="checkbox"/> Funktiolaskin / Scientific calculator <input type="checkbox"/> Ohjelmoitava laskin / Programmable calculator <input type="checkbox"/> Muu materiaali, tarkennettu alla / Other material, specified below:	
Tenttiin vastaaminen / Please answer the questions: <input checked="" type="checkbox"/> Suomeksi / in Finnish <input checked="" type="checkbox"/> Englanniksi / in English Suomenkielisessä tutkinto-ohjelmassa olevalla opiskelijalla on oikeus käyttää arvioitavassa opintosuorituksessa suomen kieltä, vaikka opintojakson opetuskieli olisi englanti. Tämä ei koske vieraan kielen opintoja. (Kts. <u>Koulutuksen johtosääntö 18 §</u>) In a Finnish degree programme a student has a right to use Finnish language for their study attainment, even though the language of instruction is English, (excluding language studies) even when the language of instruction is other than Finnish. (See <u>the Education Regulations 18 §</u>)	
Kysymyspaperi on palautettava / Paper with exam questions must be returned: <input checked="" type="checkbox"/> Kyllä / Yes <input type="checkbox"/> Ei / No	

Please answer all 5 questions (6 points each).

Question 1.

Consumer has Cobb-Douglas preferences: $U(x_1, x_2) = x_1 x_2^2$, where x_1 and x_2 are the amounts of consumed goods 1 and 2.

The price of good 1 is $p_1 = 2$ and the price of good 2 is $p_2 = 1$. Consumer's income is $m = 18$.

- Write down the budget constraint. What is the slope of the budget line?
- What does the marginal rate of substitution (MRS) measure? Calculate the marginal rate of substitution for the consumer.
- Derive the utility-maximizing ordinary demands $x_1^*(p_1, p_2, m)$ and $x_2^*(p_1, p_2, m)$, given the prices of the goods and the consumer's income.
- What is the highest achievable level of utility $U(x_1^*, x_2^*)$?

Question 2.

A farmer believes there is a 50 - 50 chance that the next growing season will be abnormally rainy. The farmer's income in the states of "normal rain" and "rainy" are Y_{NR} and Y_R , respectively. Farmer's utility from income $Y \in \{Y_{NR}, Y_R\}$ is given by

$$U(Y) = \ln Y.$$

- Suppose the farmer must choose between two crops that promise the following income prospects:

Crop	Y_{NR}	Y_R
Wheat	28000 €	10000 €
Corn	19000 €	15000 €

Which of the crops will he plant?

- Suppose the farmer can plant half his field with each crop. Would he choose to do so?
- Would wheat crop insurance - which is available to farmers who grow only wheat and which costs 4000 € and pays off 8000 € in the event of a rainy growing season - cause this farmer to change what he plants?

Question 3.

Suppose the demand curve $D(p)$ and the supply curve $S(p)$ for the market are given by the following equations:

$$D(p) = 75$$
$$S(p) = p + 10$$

- What is the market equilibrium (price and quantity) in this market? Calculate producer surplus.
- Suppose that government imposes a quantity tax $t = 5$ on firms. Solve the new market equilibrium. What happens to the producer surplus? Draw a figure.
- Calculate the tax revenue. Who ends up paying the tax? Does the consumer surplus change? If yes how much?

Question 4.

A competitive firm has the following production cost function: $c(y) = y^3 - 8y^2 + 30y$.

- What is the marginal cost function $MC(y)$?
- What is the average variable cost function $AVC(y)$?
- What is the average cost function $AC(y)$?
- At what output y does marginal cost equal average variable costs?
- Below what price, will the firm produce zero output? Explain.
- At what price would the firm produce 5 units of output?

Question 5.

In a small town there are two bakeries, A and B, baking identical breads. Denoting the amount of bread with b the cost function for both bakeries is $c(b) = 4b$. The inverse market demand curve for bread is $p(b) = 100 - 2b$. The output of bakery A is denoted with b_A and the output of bakery B with b_B .

First, assume that the two bakeries play a Cournot game (quantity competition).

- Calculate the reaction functions for both firms: $R_A(b_B)$ and $R_B(b_A)$. Draw a graph illustrating these functions, where output b_A is on the horizontal axis and output b_B is on the vertical axis. Solve the Cournot-Nash equilibrium (b_A^*, b_B^*) , and plot it on your graph. How much will bakery A produce? How much will bakery B produce?

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Now, suppose the producers follow a Stackelberg market model. Bakery A begins early, and acts as a Stackelberg leader. Bakery B is a Stackelberg follower.

- b) Write down bakery A's profit maximization problem.
Solve the leader's Stackelberg output b_A^S .
Solve the follower's Stackelberg output b_B^S .

Finally, suppose the producers operate as in a Bertrand game (price competition).

- c) What is the Nash equilibrium price p^* in this framework?
Explain the adjustment process of price setting.