YLIOPISTOTENTTI - UNIVERSITY EXAM

Opiskelijan nimi / Student name:	**Opiskelijanumero / Student number:**

Opettaja täyttää / Lecturer fills in:

Opintojakson koodi and nimi / The code and the name of the course:

721320S

ECONOMIC THEORY I

Tiedekunta / Faculty:	Oulu Business School	
Tentin pvm / Date of exam: 15.3.2017		**Tentin kesto tunteina / Exam in hours: 3**
Tentin nro / No. of the exam: 1		**Opintopistemäärä / Credit units: 6**
Tentaattori(t) / Examiner(s): Professor (acting) Jaakko Simonen		**Sisäinen postios. / Internal address:** **OyKKK**

Sallitut apuvälineet / The devices allowed in the exam:

☐ Nelilaskin / Standard calculator ☒ Funktiolaskin / Scientific calculator ☐ Ohjelmoitava laskin / Programmable calculator

☐ Muu materiaali, tarkennettu alla / Other material, specified below:

Tenttiin vastaaminen / Please answer the questions:

☒ Suomeksi / in Finnish ☒ 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. Koulutuksen johtosääntö 18 §)

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 the Education Regulations 18 §)

Kysymyspaperi on palautettava / Paper with exam questions must be returned:

☒ Kyllä / Yes ☐ Ei / No

> **Important !** You can choose to answer question 1 or 2, not both! Questions 3 - 5 are for everyone. In total you can answer to 4 questions.

1. a) Describe graphically firm's cost minimisation problem in a general level. (You can assume the Cobb-Douglas production function). (*2 points*)

   b) Suppose a firm's production function $y = z_1^{\alpha_1} z_2^{\alpha_2}$, where z_1 and z_2 are inputs, y is output and α_1 *and* α_2 are positive parameters. Using the Lagrangean method find the cost-minimising values of the inputs, i.e. conditional factor demand functions. (*You don't have to solve the cost function!*) (*4 points*)

2. We can use compensating variation, equivalent variation and consumer surplus to measure how much consumer's welfare will change after the price change. Explain carefully what these concepts mean. Use figures to describe the difference of these concepts in a case of two normal goods. *You don't have to calculate anything!* (*6 points*)

3. a) Consider a duopoly with identical firms. Define (draw a figure and explain shortly) in a general level what is the Cournot-Nash equilibrium. Draw firms' iso-profit curves, reaction functions and Nash equilibrium to the figure. (*2 points*)

   b) Lets' continue with Duopoly case. The cost function of firm 1 is $(y_1) = 30y_1$. The cost function of firm 2 is $C(y_2) = (y_2)^2$. Inverse demand function of the market is on $p = 120 - Q$, where Q is total output. Solve Cournot –Nash equilibrium, when firms make decisions over their output quantities simultaneously. What are the firms' outputs and profits in a Nash equilibrium of Cournot's model? (*4 points*)

4. a) Use Edgeworth box to describe the competitive equilibrium of the exchange economy in a case of two individuals (who have convex preferences) and two commodities. Draw a figure and explain its content carefully. Define Walras's law, contract curve and core of economy. (*2 points*)

   b) Consider an exchange economy that consists of two commodities (x and y) and two individuals (1 and 2). These individuals have their utility functions as follows

   $$u^1(x_1, y_1) = a\ln(x_1) + (1-a)\ln(y_1)$$
   $$u^2(x_2, y_2) = b\ln(x_2) + (1-b)\ln(y_2)$$

   We assume that $0 < a < 1$, $0 < b < 1$ and $a + b > 1$.

   The initial endowments ω of consumers are $(\bar{x}_1, \bar{y}_1) = (1,0)$ for consumer 1 and $(\bar{x}_2, \bar{y}_2) = (0,1)$ for consumer 2.
   Find the equilibrium price ratio. What is the equilibrium allocation? What happens in the economy if $p_1/p_2 = 1$? In which direction has the price pressures for change and why? (*4 points*)

5. A taxpayer has income y that should be reported in full to the tax authority. There is a at (proportional) tax rate γ on income. The reporting technology means that that taxpayer must report income in full or zero income. The tax authority can choose whether or not to audit the taxpayer. Each audit costs an amount φ and if the audit uncovers under-reporting then the taxpayer is required to pay the full amount of tax owed plus a fine F.

a) Set the problem out as a game in strategic form where each agent (taxpayer, tax-authority) has two pure strategies. Explain why there is no simultaneous-move equilibrium in pure strategies.

b) Find the mixed-strategy equilibrium. How will the equilibrium respond to changes in the parameters γ, φ and F?

(totally 6 points)