UNIVERSITY OF OULU

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: **721333S** **Industrial Organization**	
Tiedekunta / Faculty: **Oulun yliopiston kauppakorkeakoulu**	
Tentin pvm / Date of exam: 27.4.2017	**Tentin kesto tunteina / Exam in hours: 3**
Tentin nro / No. of the exam: 2 (esim. Tentti, 1. uusinta, 2. uusinta / e.g. Exam, 1. retake, 2. retake)	**Opintopistemäärä / Credit units: 6**
Tentaattori(t) / Examiner(s): **Mikko Leppämäki**	**Sisäinen postios. / Internal address:** **6 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

University of Oulu
Oulu Business School
Industrial Organization
Exam (3 hours), April 27, 2017

1. Consider a firm selling light bulbs with variable durability. *We interpret durability as a measure of product's quality.* There exists a consumer who lives for two periods and desires light services for two periods. Assume that a consumer is willing to pay an amount $V > 0$ per each period of light service. On the supply side, assume that light bulb-producing firm posses the technology for producing two types of light bulbs: a short-durability light bulb yielding light services for one period only, and a long-durability light bulb yielding light services for two periods. The unit cost of producing the short-durability light bulb is c^S, and the unit cost of producing a long durability-light bulb is c^L, where $0 < c^S < V$, $0 < c^L < 2V$, and $c^S < c^L$. For simplicity we ignore discounting and consider only the two extreme market structures: monopoly and perfect competition.

(i) Derive the monopolist's profit and optimal decision rule, i.e. whether to produce a short-durability or long-durability light bulbs.

(ii) Consider now perfect competition, where the competition drives the prices of each type of light bulbs to their unit costs. Derive the consumer's optimal purchasing rule of whether to buy a short-durability or long-durability light bulbs.

(iii) Based on your findings in (i) and (ii) what can you say about the effects of market structure has on the *product quality, i.e. durability of light bulb.*

2. Coca-Cola recently announced that it is developing a "smart" vending machine. Such machines are able to change prices according to the outside temperature. Suppose for the purposes of this problem that the temperature can be either "High" or "Low." On days of "High" temperature, demand is given by $q = 280 - 2p$, where q is number of cans of Coke sold during the day and p is the price per can measured in cents. On days of "Low" temperature, demand is only $q = 160 - 2p$.There is an equal number days with "High" and "Low" temperature. The marginal cost of a can of Coke is 20 cents.

(i) Suppose that Coca-Cola indeed installs a "smart" vending machine, and thus is able to charge different prices for Coke on "Hot" and "Cold" days. What price should Coca-Cola charge on a "Hot" day? What price should Coca-Cola charge on a "Cold" day?

(ii) Alternatively, suppose that Coca-Cola continues to use its normal vending machines, which must be programmed with a fixed price, independent of the

weather. Assuming that Coca-Cola is risk neutral, what is the optimal price for a can of Coke?

(iii) What are Coca-Cola's profits under constant and weather-variable prices? How much would Coca-Cola be willing to pay to enable its vending machine to vary prices with the weather, i.e., to have a "smart" vending machine?

3. In a linear Hotelling town there are 100 potential customers that are uniformly distributed on a unit kilometer (street). Each customer has a willingness to pay for pizza of 30 euros, and would buy only one pizza per week. It costs 10 euro per kilometer to travel. Assume two pizza stores are considering opening stores an opposite ends of the street. After opening, each store would have a marginal cost of 5 euros per pizza, and there is no fixed cost for opening a store.

(i) What are the equilibrium prices each store will charge for pizza? What is the profit per week of each firm?

(ii) Intuitively, would both stores be happy with their price and location choice, or would one of them want to change the price/location? What would happen to the firms' prices if they were located right next to each other?

(iii) Suppose now that the firms consider to merge. What would be the firms' incentive to merge assuming that the firms would serve the entire market after the merger. Would the firms merge?

4. Fast growing literature on behavioral industrial organization (IO) revisits classic IO questions while relaxing assumptions of the standard model. The majority of the work maintains the assumption that firms maximize profits but enriches the model of consumer behavior to be more realistic by allowing for self-control problems, loss aversion, inattention, overconfidence, confusion, and other deviations from *homoeconomicus*. Discuss the implications that consumers' *i)* Nonstandard preferences, *ii)* Overconfidence, and *iii)* Inability to choose the best price can have in the context of classic IO questions.