

YLIOPISTOTENTTI - UNIVERSITY EXAM

Opiskelijan nimi / Student name:	Opiskelijanumero / Student number:
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Opettaja täyttää / Lecturer fills in:

Opintojakson koodi and nimi / The code and the name of the course: Koodi / Code: 721345S Tentin nimi / Exam name: Environmental Economics	
Tiedekunta / Faculty: Oulun yliopiston kauppakorkeakoulu / Oulu Business School	
Tentin pvm / Date of exam: 19.4.2017	Tentin kesto tunteina / Exam in hours: 3
Tentin nro / No. of the exam: Tentti / Exam (esim. Tentti, 1. uusinta, 2. uusinta / e.g. Exam, 1. retake, 2. retake)	Opintopistemäärä / Credit units: 6
Tentaattori(t) / Examiner(s): Artti Juutinen	Sisäinen postios. / Internal address:
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 type="checkbox"/> Kyllä / Yes <input checked="" type="checkbox"/> Ei / No	

Exam instructions (in English):

This exam has 4 main exam questions. Answer to all 4 questions.

Note that you should not use more than one answer sheet (i.e. concept paper) for each main question (one answer sheet/one main question).

Same in Finnish

Tenttiohjeet:

Tässä kokeessa on neljä pääkysymystä. Vastaa jokaiseen neljään pääkysymykseen.

Vastaustila on rajoitettu kunkin pääkysymyksen kohdalla yhteen koepaperiin (yksi konsepti/pääkysymys).

1. Consider the following questions relating to pollution control.
 - a) What do we mean by flow pollutant and stock pollutant? Explain briefly and give an example of both. (1p)
 - b) Suppose now that we want to determine the efficient level of flow pollutant. Draw the typical shapes of pollution benefit and damage functions (both total and marginal). Explain the intuition behind these functions. (2p)
 - c) Identify the efficient level of flow pollutant with a graph and explain it. Also show on your graph the quantity of flow pollutant that would be achieved without pollution control. Note: Full credit requires graph plus explanation. (3p)

2. Answer the following questions concerning environmental valuation.
 - a. Total economic value of an environmental good can be divided to a number of elements. Explain this categorization. (2p)
 - b. Environmental valuation utilizes stated preference methods and revealed preference methods to value environmental goods. Explain the difference between the stated and revealed preference techniques and their pros and cons. (2p)
 - c. Describe briefly the following techniques: contingent valuation method and choice experiment. (2p)

3. Answer the following questions concerning use of non-renewable resources
 - a) Derive Hotelling rule by using a two period model and interpret the result. (3p)

b) Derive the optimal extraction path of the mine's output for the two periods by using the following figures. (3p)

Suppose that the mining company owns a fixed stock of ore. The size of stock is 15 tons. The company operates only two periods. Denote ore extraction at period t by x_t . The market price of ore (per ton extracted) is 10 euros. Accordingly, the total revenues are $R_t = 10x_t$. The total costs of extraction are $C_t = \frac{1}{2}x_t^2$. The rate of interest at which rents are discounted is 10 percent.

4. Answer the following questions concerning forestry

- a. Explain the economic problem of forest management by using the Faustmann model. Hint:
$$\pi = [pS(t)e^{-it} - k] [1 - e^{-it}]^{-1}$$
 (3p)
- b. Derive (i.e. differentiate) the criterion for an efficient forest management and felling programme (the Faustmann rule) and interpret the result. (3p)

