



YLIOPISTOTENTTILOMAKEPOHJA / UNIVERSITY EXAM TEMPLATE

Koskee tiedekuntia LuTK, OyKKK, KaTK, TTK, TST ja BMTK (Linnanmaan tentit) /
Concerns Faculties SCI, OBS, OMS, TECH, ITEE and BMM (Linnanmaa campus)

Tentin päivämäärä / Date of exam: 7.12.2015	Tentin kesto tunteina / Exam in hours: 4h
Tiedekunta / Faculty: Oulun yliopiston kauppakorkeakoulu / Oulu Business School	
Opintojakson koodi, nimi ja tentin numero / The code and the name of the course and number of the exam: 721345S, Intermediate Microeconomics, 1st Retake Exam	
Tentaattori(t) / Examiner(s): Enni Ruokamo, Hannu Huuki	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
Kysymyspaperi on palautettava / Paper with exam questions must be returned:	
<input checked="" type="checkbox"/> Kyllä / Yes	<input type="checkbox"/> Ei / No

Answer to all 5 questions.

1.

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

- a) What does the marginal utility (MU) measure?
Calculate marginal utilities MU_1 and MU_2 for both goods. 2p
- b) What does the marginal rate of substitution (MRS) measure?
Calculate the marginal rate of substitution MRS_A for consumer A. 2p

Consumer B has the following Cobb-Douglas preferences: $V(x_1, x_2) = a \ln x_1 + b \ln x_2$.

- c) Calculate the marginal rate of substitution MRS_B for consumer B.
Does utility function $V(x_1, x_2)$ represent the same preferences as $U(x_1, x_2)$? Explain. 2p

2.

Firm's production function is $y = f(x_1, x_2) = 2x_1^{1/2}x_2^{1/2}$, where y is the level of output and x_i is the amount of input i .

Assume that the cost function has the general form $c = w_1x_1 + w_2x_2$, where w_i is the price (wage) of input i .

- a) Derive the slope of the isocost line as well as the slope of the isoquant. 2p
- b) Suppose the factor prices are $w_1 = 20$ and $w_2 = 80$.
Solve the firm's conditional input demand functions $x_1^*(y)$ and $x_2^*(y)$. 2p
- c) Write down the total cost function $c(y)$.
What is the minimum cost of producing 20 units of output?
What will happen to firm's costs if it wants to double its output? 2p

3.

a)

The table below describes a factory's costs:

Quantity (Q)	Fixed costs (FC)	Variable costs (VC)	Total costs (TC)	Marginal costs (MC)	Average fixed costs (AFC)	Average variable costs (AVC)	Average total costs (ATC)
1	18	26		26			
2		44					
3		60					

Copy the table in your answer sheet and fill in the missing values. Show the calculations behind your answer. 2p

b)

Another firm has a following short-run cost function: $c(q) = q^2 + 3$, where q is the amount of output.

Write down the following cost functions: average costs $AC(q)$, average variable costs $AVC(q)$ and marginal costs $MC(q)$.

In a diagram, draw the marginal cost curve $MC(q)$ and the average variable cost curve $AVC(q)$.
The firm operates in a perfectly competitive industry. What is the inverse supply curve $S^{-1}(q)$?
Explain shortly the three conditions that you have to consider, when you solve $S^{-1}(q)$. 4p

4.

Demand for hair wax is given by equation: $q(p) = 250 - 2,5p$, where q is quantity and p is price.
The total cost of production is given by the equation: $c(q) = 0,1q^2 + 500$.
Hair wax is produced by one firm only.

- Write down the inverse demand function $p(q)$? 1p
- Write down the monopoly's profit function $\pi(q)$. 1p
- What is the profit maximizing output q^m for the monopoly?
What is the profit maximizing price $p(q^m)$?
At what level are the marginal costs $MC(q^m)$? 2p
- Is this monopoly market outcome Pareto-optimal?
Use the result in part c) and explain your answer. 2p

5.

Firm S produces steel. But it also produces pollution, which it dumps into a river. Firm F, a fishery, is located downstream and is adversely affected by the pollution.

Firm S's cost function is $c_S(s, x)$ with $\partial c_S / \partial s > 0$, where s is the amount of steel produced and x is the amount of pollution produced. The market price for steel is p_S .

Firm F's cost function is $c_F(f, x)$ with $\partial c_F / \partial f > 0$, where f indicates the production of fish and x is the amount of pollution. The market price for fish is p_F .

Suppose that pollution increases the cost of providing fish: $\partial c_F / \partial x > 0$, and that pollution decreases the cost of steel production $\partial c_S / \partial x < 0$.

- a) Write down the profit maximization problems for firms S and F. 1p
- b) Write down the first order conditions characterizing profit maximization decisions.
Explain the logic behind the equations. 2p

Suppose now that there is a market for pollution. The fishery can sell pollution unit x for price q (fishery owns the property right).

- c) Write down the new profit-maximization problems for firms F and S. 1p
- d) Write down the first order conditions characterizing profit maximization decisions. Compare these conditions to the ones in part b). What has changed? Explain. 2p

