

## YLIOPISTOTENTTI - UNIVERSITY EXAM

<b>Opiskelijan nimi / Student name:</b>	<b>Opiskelijanumero / Student number:</b>
---	---

Opettaja täyttää / Lecturer fills in:

<b>Opintojakson koodi and nimi / The code and the name of the course:</b> <b>Koodi / Code:</b> 721 310S <b>Tentin nimi / Exam name:</b> Economic Theory II	
<b>Tiedekunta / Faculty:</b> Oulu Business School	
<b>Tentin pvm / Date of exam:</b> August 14, 2017	<b>Tentin kesto tunteina / Exam in hours:</b> 3
<b>Tentin nro / No. of the exam:</b> Exam 4 (summer).	<b>Opintopistemäärä / Credit units:</b> 6
<b>Tentaattori(t) / Examiner(s):</b> Prof. Mikko Puhakka	<b>Sisäinen postios. / Internal address:</b>
<b>Sallitut apuvälineet / The devices allowed in the exam:</b> <input type="checkbox"/> Nelilaskin / Standard calculator <input type="checkbox"/> Funktiolaskin / Scientific calculator <input type="checkbox"/> Ohjelmoitava laskin / Programmable calculator <input type="checkbox"/> Muu materiaali, tarkennettu alla / Other material, specified below:	
<b>Tenttiin vastaaminen / Please answer the questions:</b> <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> )	
<b>Kysymyspaperi on palautettava / Paper with exam questions must be returned:</b> <input checked="" type="checkbox"/> Kyllä / Yes <input type="checkbox"/> Ei / No	

Answer three (3) questions from the set of questions 1-4 below and three (3) from questions 5-8. You can answer in Finnish. The weight of each question is the same.

1. (6p) Build up a formal ISLM model with the appropriate assumptions so that monetary policy is ineffective.
2. (6p) Let a consumer's lifetime utility function be:  $v(c_1, c_2) = \ln c_1 + \beta \ln c_2$ , where  $1 > \beta > 0$ . The consumer lives for two periods. The lifetime budget constraint is:  $c_1 + \frac{c_2}{R} \leq y_1 + \frac{y_2}{R}$ .  $y_1$  ( $y_2$ ) are positive endowments (or incomes) and  $R$  is the interest factor. Derive the saving function of the consumer and his/her first period consumption.
3. (6p) Let the storage technology in the two-period model be  $f(k) = Ak^\alpha$ , where  $A > 0$  and  $1 > \alpha > 0$ . The lifetime utility function is  $v(c_1, c_2) = c_1 + \beta c_2$ , where  $1 > \beta > 0$ . What is the interest factor in a competitive equilibrium? Proof and a short discussion suffices (riittää)!
4. (6p) Let the aggregate production function be Cobb-Douglas:  $Y = AK^\alpha L^{1-\alpha}$ ,  $0 < \alpha < 1$ , and with  $A > 0$ . Denote the positive marginal propensity to save by  $s$  and the growth rate of population (the number of employed people) by  $n$ . There is no depreciation and no technical progress. Describe the evolution of this economy (i.e. basically the capital per capita) over time.
5. (6p) Consider the following problem: maximize  $\sum_{t=0}^{\infty} \beta^t \ln c_t$  subject to  $c_t + k_{t+1} = Ak_t^\alpha$ .  
 $0 < \beta < 1$ ,  $0 < \alpha < 1$  and  $A > 0$ . Solve the problem with dynamic programming as far as you can. In particular, answer the following questions:
  - (i) Write down the Bellman equation.
  - (ii) Characterize the steady state.
  - (iii) Sketch the dynamics as far as you can.
 (Hint: there is the Euler condition somewhere!!!)
6. (6p) Explain the contents of the Phelps-Koopmans inefficiency theorem.
7. (6p) Let the objective function (to be maximized) for the policy authority to be
 
$$M(y, \pi) = -\frac{1}{2} \left[ (y - k\bar{y})^2 + a\pi^2 \right] \text{ ja } k > 1.$$

$a$  is the weight given to inflation in the objective function.  $y$  ( $\bar{y}$ ) is the aggregate output (potential output) and  $\pi$  the rate of inflation. The private sector's behavior is described by the following Phillips curve:  $y = \bar{y} + \gamma(\pi - \pi^e)$ ,  $\gamma > 0$ .  $\pi^e$  is the expected inflation. Why do we need

the assumption  $k > 1$ . Solve the time consistent equilibrium. Pay attention to the concepts, you use.

8. (6p) The public debt as a fraction of GDP ( $b_t$ ) evolves over time in the following manner:

$$b_{t+1} = d + \frac{1+r}{1+g} b_t. \quad d \text{ is the primary deficit as a fraction of the GDP, } r \text{ the real rate of interest}$$

and  $g$  the growth rate of the real GDP. You can assume:  $r > 0$  and  $g > 0$ . If  $d > 0$ , is it possible that the debt in a stationary state is always positive? If your answer is yes, do you need some assumptions for that result?

**Return the question sheet!!!**

