Tentin päivämäärä / Date of exam:9.12.2015	Tentin kesto tunteina / Exam in hours:4
Tiedekunta / Faculty: OBS	
Opintojakson koodi, nimi ja tentin numero / The code and the name of the course and number of the exam: 721310S Economic Theory II. 1. tentti.	
Tentaattori(t) / Examiner(s): Prof. Mikko Puhakka	Sisäinen postios. / Internal address : Taloustiede/OBS
Sallitut apuvälineet / The devices allowed in the exam: ☒ Nelilaskin / Standard calculator x 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	
Kysymyspaperi on palautettava / Paper with exam questions must be returned: ☒ Kyllä / Yes ☐ Ei / No	

University of Oulu, Economics, Fall 2015
Professor Mikko Puhakka
Econ Theory II, Exam December 9, 2015.

Answer all the questions! You can answer in Finnish. The weight of each question is the same. Good Luck!

1. (6p) Consider the following ISLM model:

(a) $\underset{- \ +}{\frac{M}{P} = L(r, Y)}$

(b) $\underset{+ \ - \ + \ -}{Y = E(Y, r, G, T,)}$ and with the assumption $0 < E_Y < 1$.

Equation (a) is the LM curve, where r is the real rate of interest. Equation (b) is the IS curve, where on the left-hand side there is the aggregate output (income) and on the right-hand side total expenditures (consumption, investment, and government expenditures (G)). In the brackets below, the signs of the partial derivatives are shown (the signs of their effect on expenditures (E) and demand for money (L)). Lump-sum taxes are denoted by T. The endogenous variables of the model are aggregate output (Y) and the real rate of interest (r).

(i) What conditions do you need to make sure that the endogenous variables are functions of the exogenous variables?

(ii) What is the effect of an increase in government expenditures (G) on the model's equilibrium with the assumption that taxes do not change

2. (6p) Consider the following macro model, where the variables are in logarithms:
   (1) $m = p + y$
   (2) $p = p^e + a(y - y^*),\ a > 0$
   (3) $m = \overline{m} + \omega$.
   Equation (1) is the demand function for money, (2) is the Phillips curve and (3) the monetary policy rule. y^* is the potential output. ω is a shock to monetary policy. Its mean is zero and the variance is finite. $\overline{m}$ is some constant. p^e is the expected price level. Solve the rational expectations equilibrium of the model, i.e. solve the level of aggregate output (y) and price level (p) in that equilibrium. What is p^e, when the economic agents (taloudenpitäjät) have rational expectations?

3. (6p) Let the storage technology in the two-period model be $f(k) = Ak$, where $A > 0$. The lifetime utility function is $v(c_1, c_2) = \frac{c_1^{1-\sigma}}{1-\sigma} + \beta \frac{c_1^{1-\sigma}}{1-\sigma}$, where $1 > \sigma > 0$ and $1 > \beta > 0$. What is the interest factor in a competitive equilibrium? Proof and a short discussion suffices (riittää)!

4. (6p) Let the aggregate production function be the following: $Y = AK$ with $A > 0$. Denote the positive marginal propensity to save by s, the growth rate of population (the number of employed people) by n, and the depreciation rate by δ. All of these parameters are positive. There is no technological progress. What assumptions on the parameters you need to get perpetual growth in this model?

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 $A > 0$. Answer the following questions:
   (i) Write down the Bellman equation.
   (ii) Characterize the steady state.
   (iii) Sketch the dynamics as far as you can.

6. Let the objective function (to be maximized) for the policy authority be $M(y, \pi) = -\frac{1}{2}\left[(y - k\overline{y})^2 + a\pi^2\right]$ ja $k > 1$.
   a is the weight given to inflation in the objective function. y ($\overline{y}$) is the aggregate output (potential output) and π the rate of inflation. The private sector's behavior is described by the following Phillips curve: $y = \overline{y} + \gamma(\pi - \pi^e), \gamma > 0$. π^e is the expected inflation. Is the Ramsey equilibrium time consistent in this model? Why, why not. Pay attention to the concepts, you use.

Return the question sheet!!!