Tentin päivämäärä / Date of exam:13.1.2016	**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. 2. 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 January 13, 2016.

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) $$\frac{M}{P} = \underset{0\ \ +}{L(r,Y)}$$

(b) $$Y = \underset{+\ -\ +\ -}{E(Y,r,G,T,)}$$ 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 a change in taxes (T) on the model's equilibrium with the assumption that public expenditures do not change?

2. (6p) Let the two period lived consumer's lifetime utility function be: $v(c_1,c_2)=c_1+\beta\ln c_2$, where $1>\beta>0$. The lifetime budget constraint is: $c_1+\frac{c_2}{R}\leq y_1-T_1+\frac{y_2-T_2}{R}$. y_1 (y_2) are positive endowments (or incomes) and R is the interest factor. T_1 (T_2) are the lump-sum taxes in the respective periods. How does a permanent increase in taxes by the amount Δ in both periods affect the first period's 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 $v(c_1,c_2)=\ln c_1+\beta\ln c_2$, where $1>\beta>0$. What is the interest factor in a competitive equilibrium? Proof and a short discussion is enough!

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. What is the growth rate of output per capita on the balanced (steady state) growth path?

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) Consider the following problem

$$\max_{\{c_t\}_{t=1}^{\infty}} \sum_{t=1}^{\infty}\beta^{t-1}\ln c_t$$

subject to $W_{t+1}=W_t-c_t$, ja $W_1=10000$.

(i) How does period t's consumption depend on the same period's wealth, when the consumer is optimizing?

(ii) How does wealth evolve (kehittyy) over time?

7. (6p) Let the objective function (to be maximized) for the policy authority to be $M(y,\pi) = -\frac{1}{2}\left[(y - k\bar{y})^2 + a\pi^2\right]$ ja $k > 1$.

   a is the weight given to inflation in the objective function. y ($\bar{y}$) is the aggregate output (potential output) and π the rate of inflation. The private sector's behavior is described by the following Phillips curve: $y = \bar{y} + \gamma(\pi - \pi^e), \gamma > 0$. π^e is the expected inflation. 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: $b_{t+1} = d + \frac{1+r}{1+g} b_t$. d is the primary deficit as a fraction of the GDP, r 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!!!