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ECON 405
ECONOMIC GROWTH AND DEVELOPMENT **26 January 2011**
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Final

1. (**50 points**) Suppose the economy is characterized by a production function in the form $Y_t = K_t^{\alpha}(A_t L_t)^{1-\alpha}$, where $A_t = A_0 e^{at}$, $A_0 = 1$, $a > 0$, and $L_t = L_0 e^{nt}$, $L_0 = 1$, and $n > 0$ and an overall utility function $U(c) = \int_0^{\infty} u(c_t) e^{-(\rho-n)t} dt$, where the instantaneous utility function *u(·)* belongs to the constant elasticity of intertemporal substitution (CIES) class: $u(c_t) = \frac{c^{1-\theta}-1}{1-\theta}$, $\theta > 0$.

a. (**20 points**) Solve the household's intertemporal utility maximization problem.

b. (**15 points**) Solve the firm's profit maximization problem.

c. (**15 points**) Solve the model at the steady state and find the equilibrium values of capital, output, and consumption.

2. (**20 points**) Suppose that a Social Planner's optimization problem is

$$U = \int_0^{\infty} e^{-(\rho-n)t} \frac{(c \cdot h^{\gamma})^{1-\theta} - 1}{1-\theta} dt$$
$$\dot{k} = k^{\alpha} - c - I_h - (n+\delta)k \qquad \text{(S)}$$
$$\dot{h} = I_h - (n+\delta)h$$

Set up the Hamiltonian and indicate the first order conditions (do **NOT** solve the model):

3. (**30 points**) Suppose the economy's production function is $Y = AK + B$, where A is a productivity parameter and B is a **constant number**. For simplicity, suppose that population is constant and normalized to one in the economy. We also assume that capital does not depreciate, $\delta = 0$. By using the social planner's approach, solve the standard problem and find the steady state values of capital, output, and consumption, if possible. In what economically significant way would results differ from the first question? Discuss. Hint: We assume that $A > \rho$.