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NAME:

ECON 603
Macroeconomic Theory **12 January 2010**
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Final

1. (**50 points**) Suppose that we are in a forward-looking deterministic world. Let us suppose that overall utility function is defined as

$$U = \sum_{j=0}^{\infty} \left(\frac{1}{1+\rho}\right)^j U(C_{t+j})$$

We assume that the momentary utility function is $U(C) = \frac{C^{1-\theta}-1}{1-\theta}$. The budget constraint of the consumer is

$$B_{t+1} = (1+r)B_t + Y_t - C_t$$

in which B is bonds, Y is income and C is consumption. We assume that $Lim_{j\to\infty}\left(\frac{1}{1+\rho}\right)^j B_{t+j} \geq 0$, that is, there is no Ponzi game. Show that consumption at period t is determined by the return on present value of wealth.

2. (**50 points**) Suppose that we are given a stochastic general equilibrium model with the following specifications. The social planner has to maximize overall utility, which is function of consumption C and leisure l, defined as

$$U = E_0\left[\sum_{t=0}^{\infty} \left(\frac{1}{1+\rho}\right)^t U(C_t, l_t)\right]$$

In the equation, E_o is expectations operator. We assume that the momentary utility function is $U(C,l) = lnC + \gamma lnl$. We assume that the production function is defined as

$$Y_t = A_t K_t^{\alpha} N_t^{1-\alpha}$$

where productivity level A_t is defined as $lnA_{t+1} = b \cdot lnA_t + \varepsilon_{t+1}$, $b < 1$ capital K_t accumulates according to $K_{t+1} = (1-\delta)K_t + I_t$, where δ is depreciation rate and $I = Y - C$ is investment level and N is time allocated for work, where $N_t + l_t = 1$. Note that, under given assumptions, the macroeconomic budget constraint of the social planner becomes

$$K_{t+1} = (1-\delta)K_t + Y_t - C_t$$

Find the first order conditions and linearize the model.