Econ 702, Spring 2007
Problem set 2[1]
Due Tuesday Feb. 6th

Problem 1. *Characterize the relationship between commodity prices (output/consumption, capital services and labor services) in the valuation equilibrium framework, when the depreciation rate is not equal to 1, i.e., when the problem looks like the following:*

$$\max_{x \in X} \sum_t \beta^t u\left[c_t(x)\right]$$

such that

$$\sum_t \left[p_{1t}\{c_t + k_{t+1} - (1-\delta)k_t\} - p_{2t}k_t - p_{3t}\right] \leq 0$$

Problem 2. *Consider the sequential market formulation of the deterministic growth model:*

$$\max_{\{c_t, k_{t+1}\}_{t=0}^{\infty}} \sum_t \beta^t u\left[c_t\right]$$

s.t.

$$c_t + k_{t+1} + \ell_t = \ell_{t-1}R_{t-1}^{\ell} + k_t R_t^k + w_t \quad \forall t$$

Write the definition of a sequential market equilibrium (SME) as completely as you can.

Problem 3. *For the stochastic growth model, verify the conditions on L, X and Y (commodity space, consumption possibility set and production possibility set) such that the uniqueness and welfare theorems apply.*

Problem 4. *Write the definition of SME for the stochastic growth problem.*

Problem 5. *We saw in class that the sequential budget constraint for the stochastic growth model is:*

$$c_t(h_t) + k_{t+1}(h_t) + \ell_t(h_t) + \sum_{z_{t+1}} q_t(h_t, z_{t+1}) b_t(h_t, z_{t+1}) =$$
$$R_t^k(h_t)k_t(h_{t-1}) + R_t^{\ell}(h_{t-1})\ell_{t-1}(h_{t-1}) + w_t(h_t) + b_{t-1}(h_{t-1}, z_t)$$

Characterize equilibrium return rates ($R_t^k(h_t)$ and $R_t^{\ell}(h_{t-1})$) in terms of $q_t(h_t, z_{t+1})$

[1]Throughout this problem set, I'm using the simplifying assumption that the aggregate production technology has constant returns to scale, so I can omit firms from the definition of maximization problems... but you shouldn't omit them from equilibrium definitions!

Problem 6. *Write a modification to the stochastic growth model with two locations (All remaining/neccessary assumptions are yours to make). Write the commodity space, the consumption possibility set and the production possibility set and pose the maximization problem with both a 'Valuation-equilibrium' budget constraint and a 'sequential market equilibrium' budget constraint.*

(note: this question is left open intentionally. There is no correct answer, but CONSISTENT answers, i.e., your response must be consistent with your assumptions)