(15) 1. Is the monetary authority able to twist the yield curve (i.e. the term structure of interest rate) from a positive slope to a negative slope ?

(15) 2. In order to stimulate the slack economy, the government decides to increase its spending. Please analyze the impact of each financing method upon interest rate and real output.

(20) 3. The efficiency wage model is specified by

production function: $y = f(eN)$, $f' > 0$, $f'' < 0$

efficiency function: $e = e(W/P)$, $e' > 0$

where e=worker effort, N=labor, eN=efficiency labor, W=nominal wage, P=price level, y = real output.

i. How do we determine the efficiency wage ? Does this represent a real wage rigidity or a nominal wage rigidity?

ii. How do we derive the aggregate supply curve ?

iii. Is it possible for an unemployed worker to lower his desired wage to obtain a job in this model ?

iv. Does the labor market clear in this model ?

4. (20%) Consider an economy where each person lives for two periods. The utility function of a representative agent is

$$u(c_1, c_2) = \ln c_1 + \ln c_2$$

where c_1 is consumption when young and c_2 is consumption when old. The production function is

$$y = k^{1/4}$$

where y is the amount of output per worker and k is the amount of capital per worker. People work when young and retire when old. Assume that both labor and capital are paid their marginal products.

(1) Express the gross interest rate, R, and wage rate, w, as functions of k.

(2) Solve for the consumption and saving when young as functions of wage income and gross interest rate.

(3) Consider two types of taxes – a wage income tax at rate λ which takes $\lambda \cdot w$ from each worker, and a tax on the gross interest rate at rate θ. Express the consumption and saving when young as functions of wage income, gross interest rate, and the tax rates.

(4) Consider instead two lump-sum taxes – a tax of τ_1 on each young person and a tax of τ_2 on each old person. Suppose that government spending has no effect on people's utility. Let g_1 and g_2 denote government spending per capita in period 1 and period 2. Show that for a fixed level of government spending, a deficit-financed tax cut (i.e., government reduces tax in period 1 but raises tax in period 2) have no effect on consumption and interest rate. (*Hint*. Find the government's life-time budget constraint first.)

5. (15%) Consider an economy with overlapping generations of two-period lived people (i.e., in each period of time, there are young persons and old persons in the economy). Assume that people have endowments of y_1 goods when young and y_2 goods when old. Suppose that young people face a gross real interest rate R. Consider a "pay-as-you-go" social security plan that collects f goods from each young person and distribute these goods evenly to old people. The gross population growth rate is n. We assume that consumption when young and consumption when old are both normal goods. Find the effect of this plan on the lifetime wealth of future generations, consumption when young and old, and saving by the young in each of the following cases:

(1) Population is constant and $R > 1$.

(2) Population grows at the rate $n > R$.

6. (15%) *Suppose that the production function is*

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha}, \quad 0 < \alpha < 1$$

where Y, K and L denote output, capital and labor, respectively, and A could be interpreted as "knowledge." Output is divided between consumption and investment. One unit of output devoted to investment yields one unit of new capital but existing capital depreciates at rate δ. Suppose that the population grows at rate n. In the steady state where capital per worker (K/L) is at a constant level, find the growth rate of output per worker for the following cases:

(1) "Knowledge" is at a constant level ($A_t = A$ for all time t).

(2) "knowledge" grows at rate e.