14.472 Problem set 3
Spring 2004

Question 1

Set up an olg model with the following characteristics (use similar notation to that in the handouts) and describe steady state equilibrium:
Technology is linear.
There is no population growth.
The fraction α of the population does no saving, while the rest are standard life-cycle savers.
People live for 3 periods, working in 2 and being retired in the third.
Labor supply is inelastic.
Utility (apart from a constant for labor disutilities), as a function of the three consumption levels, satisfies

$$U[x, y, z] = xyz$$

There is a social security system financed by a payroll tax and the interest on assets in a trust fund.
There is public debt outstanding. The interest on the public debt is financed by a lump-sum income tax on workers (but not retirees).
There are no government expenditures other than interest on the outstanding public debt.

Question 2

Assume that the government increases the payroll tax rate by Δt for one period, using the revenue to permanently increase the trust fund, with the additional interest earnings used to lower the payroll tax rate thereafter.
Describe equilibrium in the initial period.
Describe equilibrium after the economy has reached a new steady state.

Question 3

Assume that in addition to the increase in the payroll tax just analyzed, the government also decreases the income tax in the initial period by an amount chosen to offset a fraction θ ($0 \leq \theta \leq 1$) of the additional payroll tax revenue. The government budget balances at the new level of public debt outstanding thereafter.
Describe equilibrium in the initial period.
Describe equilibrium after the economy has reached a new steady state.

Question 4

How would your answer to the previous question be different if the nonsavers paid the payroll tax (and received the retirement benefit) but paid no lump sum income tax to cover the interest rate and the savers were not covered by social security - neither the payroll tax nor the benefits.