1. Consider the model of optimal dynamic consumption, where income is taken to be exogenous.
   a. Suppose that a permanent tax is imposed on both interest and labor income at a fixed rate $\rho$. Write the households dynamic budget constraint to include the tax. Analyze the effects of the tax on the optimal consumption path using a graphical approach.
   b. Suppose that the representative household must borrow at a higher interest rate than the rate at which it can lend. Graphically show how this case can be analyzed, and predict the effects on the optimal consumption path.

2. Consider now the model of optimal consumption and labor supply. Analyze the effect of a tax on labor income at constant rate $\rho$ on current and future labor supply assuming that utility is log-linear (see p. 45 of the overheads).

3. Using the phase diagram developed in class, describe the transitory dynamics of capital and $q$, and the effects on their steady-state values, of the following:
   a. an increase in the rate of depreciation ($\delta$).
   b. an increase in aggregate output.
   c. the imposition of a permanent, proportional tax on investment.

4. As we’ve seen in class, the condition for the stock of capital to be optimal (the second first-order condition) defines a difference equation in the shadow value, $q_t$ (see p. 49 of the overheads). Solve this difference equation forward for $q_t$ and interpret the result.