Instructions: This is a 75 minute examination worth 100 total points. Each question is worth 25 points. Choose FOUR out of the following SIX questions. DO NOT ANSWER MORE THAN FOUR QUESTIONS. If you do, your grade will be based on the LOWEST four questions.

In order to get full credit, you must give a clear, concise, and correct answer, including all necessary calculations. Notes and books will not be permitted. Explain your answers clearly and use graphs when helpful.

1. Suppose that there is a temporary change in consumer sentiment, so that households cut back on consumption spending, but this has no other direct effects on the economy. Consider the Keynesian model with sticky prices, and discuss the short and long run effects on output and interest rates of the following policy options.

   (a) The money supply is adjusted to return the economy to full employment.

   (b) Government spending is adjusted to return the economy to full employment.

2. Consider the Solow model with the addition of government spending. Suppose productivity is constant, so the only source of growth is the population (and hence labor force) which grows at rate $n = \dot{N}/N$. The government spends a constant amount per capita each period, so $G = gN$ where $g$ is a positive constant. Spending is financed via lump sum taxes, and the government balances its budget each period, so $G = T$. Consumers save a constant fraction $s$ of after-tax income, so $C = (1 - s)(Y - T)$.

   (a) Show that there can be two steady state levels of the per-capita capital $k = K/N$.

   (b) Ignore the low capital steady state, and analyze the effects of an increase in $g$. What are the effects on per-capita capital and output in the steady state?

3. Suppose that problems in the banking sector lead to an unanticipated reduction in the money supply. In each of the following scenarios consider the effects of this shock on output and real interest rates. In addition, suppose that one option to respond to this shock would be to increase government spending temporarily. If the policy goal is to stabilize output, is this fiscal policy response a good idea?

   (a) Use the Lucas-type misperceptions model.

   (b) Use the Keynesian model
4. Suppose that a household does not face a cash in advance constraint, but instead money is the only asset for transferring income over time. That is, suppose that household preferences are given by:

\[ \log C + \beta \log C'. \]

The household has real unearned income \( Y \) in period 1, and uses money \( M \) to transfer assets to the future, thus facing the budget constraints:

\[ PC + M = PY \]
\[ PC' = M \]

(a) Find the household’s money demand function and show that it is decreasing in the inflation rate.

(b) Relate your results to the quantity theory of money \( MV = PY \). What is the velocity of money in this problem?

5. Suppose that everyone knows that government spending is to be increased for one period, but because of delays in Congress it may take effect either in the current year or the next. Using our real dynamic general equilibrium model, find the effects of this increase on the current values of output, interest rates, employment, and real wages in the following two scenarios.

(a) The increase is announced in the current period and takes effect immediately. Next year spending returns to its original level.

(b) The increase is announced in the current period but takes effect next year. This year spending remains at its original level.

6. Consider a real business cycle type model without labor. The sole input in production is capital \( k_t \), which is owned by households and rented to firms at a rental rate \( r_t \). That is output is produced via \( y_t = A_t k_t \) where \( A_t \) is the technology factor. Capital depreciates at rate \( \delta \), and investment is given by \( I_t \) so the law of motion for capital is:

\[ k_{t+1} = (1 - \delta)k_t + I_t. \]

Households have logarithmic utility over consumption and discount with factor \( \beta \):

\[ U(c_0, c_1, \ldots) = \sum_{t=0}^{\infty} \beta^t \log(c_t) \]

The household budget constraint each period is thus:

\[ c_t + I_t = r_t k_t \]

(a) Write down the firm’s profit maximization problem, and derive an expression for the real interest rate at any date \( t \).

(b) Write down the household utility maximization problem, and considering the choice of consumption at two arbitrary dates \( t \) and \( t+1 \), find the Euler equation.

(c) Suppose that \( A_t = A \) is constant. Under what conditions is equilibrium consumption increasing?