Answer all of the following questions. Each is worth 20 points. Label all axes, curves, initial values, intercepts, and all values after shocks.

1. Labor supply
   a. Write the equation for the agent’s budget constraint in a one-period model relating consumption and leisure when he must pay a lump-sum tax of $T$ to the government, independent of how much he works or consumes. (5 points)

   b. Draw a graph of the household’s choice between leisure and consumption. Label everything including intercepts. (Assume that his initial wealth $(a)$ exceeds the value of the tax $(T)$). Show how a tax cut affects the equilibrium values of consumption and leisure. (8 points) Use the income effect to explain the results in words. (2 points)

   c. Draw a graph of labor market equilibrium and illustrate the effect of the tax cut on equilibrium values for the wage and employment. (5 points)
2. Labor demand
   a. Draw a graph of the firm’s marginal product of labor as a function of the size of employment (N). Assume that the firm faces a fixed wage for any quantity of labor it hires, and illustrate on the graph the firm’s desired level of employment. (4 points) On your graph, how is the marginal product of labor related to labor demand? (3 points)

   b. Now, assume that the government levies a new tax on the firm’s production. Explicitly, the firm gets to keep only (1-t) of the marginal product of labor because it must pay (t) times the marginal product of labor to the government. Use the space below to compare the original labor demand curve with the new one. Explain in words. (8 points)

   c. Draw a graph of labor market equilibrium and use it to illustrate the effect of the policy change. How do values for equilibrium employment and the wage change? (5 points)
3. Investment demand
   a. Draw a graph of the firm’s marginal product of capital as a function of the size of the capital stock (K). Assume that the firm faces a fixed user cost of capital, illustrate on the graph the firm’s desired level of capital next period (4 points) On your graph, how is the marginal product of capital related to the firm’s capital demand? (3 points)

   b. Assume that there is an increase in the expected future value productivity, which we label A in the production function. How is the marginal product of capital affected? Explain in words or using an equation. How is the firm’s demand for future capital affected? Use the space below to compare the original capital demand curve with the new one. (6 points)

   c. Write an equation for investment and use the equation and your results above on the demand for capital next period to explain investment is affected. (2) Draw a graph of goods market equilibrium and show how the equilibrium quantities of savings and investment, as well as the interest rate change (5 points).
4. Savings demand – (assume no government)
   a. Consider a household using a two-period model in which he must decide how much to consume today and how much to consume in the future. Write the household’s budget constraint relating present value consumption to the present value of lifetime resources, being explicit about what those lifetime resources are. (3 points) Draw the graph (labeling everything) showing how the household chooses current and future consumption (4 points).

b. Now assume that expected future income increases. Use your graph above (same graph) to show how current and future consumption change. Does the income effect, the substitution effect or both apply to this problem? Explain. (6 points)

c. Define savings. How does the demand for savings change. (3) Draw a graph of goods market equilibrium and show how the increase in expected future income affects the equilibrium interest rate and equilibrium quantities of savings and investment (4 points).
5. Assume that an economy has the following data:
Government spending = $150
Present value of expected future government spending = $150
Current Taxes = $200
Initial government debt = $600
Price level = 100
Expected future price level = 102
Exports = $100
Imports = $150
Net factor payments = $50
Consumption = $800
Investment = $100
Nominal interest rate = .02 = 2%

Solve for values for the following and put your answers in the blank. Values can be positive or negative so be careful to mark negative values as such. Show your work neatly for partial credit.

Gross Domestic Product ________________________
Gross National Product__________________________
Private Saving _______________________________
Government Saving __________________________
National Saving _____________________________
Expected Inflation____________________________
Real interest rate _____________________________
Current Account________________________________________________