Test Questions

**Part I – Midterm Questions**

1. Give three examples of a stock variable and three examples of a flow variable.

2. True or False: A Laspeyres price index always overstates the rate of inflation.

3. Recently, the prices of stocks and bonds increased upon the announcement that the U.S. unemployment rate had increased. In other words, this announcement was treated as good news for the economy. How can this be?

4. The use of the Cobb-Douglas production function is based on two attributes. What are these and what are their importance?

5. In studying the behavior of growth in many different economies, Nicholas Kaldor documented several common characteristics; this observation was instrumental in shaping Robert Solow’s theory of growth. Describe four of Kaldor’s stylized facts.

   Use the Solow model of growth to answer questions 6-8.

6. If an economy is not in a steady-state equilibrium and the current MPK of capital is less than that in the steady-state, describe the implied time path of capital, output, and consumption.

7. Suppose that a country's production function is \( Y = K^{1/2}L^{1/2} \).
   a. What is the per-worker production function \( y = f(k) \)?
   b. Suppose that the country possesses 40,000 units of capital and 10,000 units of labor. Determine the level of output and output per worker.
   c. If the depreciation rate is 10%, what is savings rate is needed to make the current capital-labor ratio consistent with steady-state?
   d. If the economy is currently in a steady-state, is it also at the Golden Rule level of capital accumulation? If not, what policies could be pursued to reach the Golden Rule?

8. If the production function is \( Y = K^{\alpha}L^{1-\alpha} \) and the depreciation rate is \( \delta \), prove that the savings rate necessary to support the Golden Rule level of capital is always equal to \( \alpha \).

9. What are the three approaches to measuring an economy’s aggregate income?

10. In our discussion of factor incomes, we presented a simple model of a firm's demand for capital and labor. Within that model, identify the exogenous and endogenous components.

11. Suppose the current labor force is 100 million and the unemployment rate is 5%. Which of the following will lead to the greatest reduction in the unemployment rate:
   a. 1 million unemployed find jobs.
   b. 2 million unemployed stop looking for work.
   c. 5 million people join the labor force and all find work.
   d. 10 million people join the labor force and half find work.

   What does your answer imply about the unemployment rate as a measure of economic well-being?
12. Consider the following information from a hypothetical economy:

<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>1991</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of good A</td>
<td>$100</td>
<td>$200</td>
</tr>
<tr>
<td>Quantity of good A</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Price of good B</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td>Quantity of good B</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

b. Compute real GNP in 1991 using 1990 as the base year.
c. Compute the inflation rate in 1991 using the GNP deflator.
d. Compute the inflation rate in 1991 using the CPI (assume both goods are consumption goods).
e. Does the relation between your answers to (c) and (d) reflect the typical relation between these two price indices?

13. The following table presents growth rate data for four countries (A, B, C, and D) between 1998 and 2008:

<table>
<thead>
<tr>
<th>Annual Growth Rate</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal GDP</td>
<td>30</td>
<td>22</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>Price Level</td>
<td>18</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Population</td>
<td>10</td>
<td>8</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

a. Which country has the largest rate of output growth per capita?
b. Which country has the smallest rate of output growth per capita?

14. A nation’s rate of economic growth in 1997 was 5 percent. It accumulated capital at a rate of 5 percent and added to its employment of labor at a rate of 5 percent. Labor’s share in this economy was 30%. What was the growth rate in total factor productivity during 1997?

15. Prove each of the following statements about the steady state of the Solow model with population growth and technological progress:

a. The capital output ratio is constant.
b. Capital and labor each earn a constant share of an economy’s income.
c. Total capital income and total labor income both grow at the rate of population growth plus the rate of technological progress, $n + g$.
d. The real rental rate of capital is constant and the real wage grows at the rate of technological progress, $g$. 
16. One view of the consumption function is that workers have high propensities to consume and capitalists have low propensities to consume. To explore the implications of this view, suppose that an economy consumes all wage income and saves all capital income. Show that if the factors of production earn their marginal product, this economy reaches the Golden Rule level of capital.

17. Suppose the production function is given by \( Y = A \sqrt{KL} \) where \( Y \) is GNP, \( K \) is capital, and \( L \) is labor. Initially, \( A \) is equal to 10. If all factors are employed and the supply of capital and labor is 100 and 400 respectively, what is:
   a. GNP?
   b. The total amount of output paid to labor?
   c. The total amount of output paid to capital?
   d. The real wage of labor?
   e. The real rental price of capital?

18. In the U.S., capital income is about 30% of GNP, the average growth of output is roughly 3% per year, the depreciation rate is 4% per year, and the capital-output ratio is approximately 2.5. Assume that the underlying production function is Cobb-Douglas and that the U.S. has been in a steady-state.
   a. What must the U.S. saving rate be?
   b. What is the current marginal product of capital?
   c. Show that the U.S. is not at the Golden Rule level of capital.

19. Using the Solow model and assuming no change in population or technology, answer the following:
   a. What condition determines the steady-state level of capital?
   b. What defines the Golden Rule of capital accumulation?
   c. In order for capital to be at the level implied by the Golden Rule, what condition must be satisfied?

20. The neutron bomb (developed in the 1980’s) is a device that kills people through radiation but does minimal property damage. Suppose, heaven forbid, that this weapon is used on a country that is experiencing steady-state growth - describe the effects on output, the capital stock, and growth (both in the new steady-state and the transition to the new steady-state) using the Solow growth model.

21. An economy is in a steady-state with no productivity change. Because of an increase in acid rain the rate of capital depreciation rises permanently. Using the Solow growth model, determine the effects on steady-state capital per worker and output per worker. Is the long-run growth rate of the total capital stock affected? If so, in what way?

22. Suppose that total capital and labor both increase by the same percentage amount, so that the amount of capital per worker, \( k \), doesn’t change. Writing the production function in per-worker terms, \( y = f(k) \), requires that this increase in capital and labor must not change the amount of output produced per worker, \( y \). Use the growth accounting equation to show that equal percentage increases in capital and labor will leave output per worker unaffected (assume a Cobb-Douglas production function with constant returns to scale).

23. The economy of Ur is in steady-state. The capital stock in Ur grows at 4% per year while the annual depreciation rate of capital is 2%. If labor's share of income is 60% and the real price of capital is 2 units of output, what is the current savings rate?

24. In a recent new release it was reported that the CIA was "flooding Iraq with fake currency." What purpose would such a dastardly plot have?
25. Within the Solow growth model with population growth and technological change, suppose the production function is: 
\[ y = k^{0.5} \]
where \( y \) denotes output per labor efficiency units and \( k \) denotes capital per labor efficiency units. Suppose that a developed country has a saving rate of 28% and a population growth rate of 1% per year; in contrast a less developed country has a saving rate of 10% and a population growth rate of 4% per year. In both countries \( g = 0.02 \), and \( \delta = 0.04 \). Find the steady-state level of \( y \) for each country.

26. Suppose the U.S. Congress enacts legislation that discourages saving and investment, such as the elimination of the investment tax credit that occurred in 1990. As a result, suppose the investment rate falls permanently from \( s' \) to \( s'' \). Examine this policy change in the Solow model with technological progress, assuming that the economy begins in steady state. Sketch a graph of how the log of output per worker evolves over time with and without the policy change. Make a similar graph for the growth rate of output per worker.

27. The Cobb-Douglas production function implies that factors' marginal and average products are proportional. What is the justification for this restriction. What additional restriction is implied by the Cobb-Douglas production function? What is its justification?

28. Suppose that a country's production function is \( Y = K^{1/4}(LE)^{3/4} \).
   a. What is the per-labor efficiency units production function: \( y = f(k) \)?
   b. Suppose that the country possesses 160,000 units of capital and 405,000 units of labor and 2 units of efficiency. Determine the level of output and output per worker.
   c. If the savings rate of the economy is 8% and the economy is growing at 17%, what is the depreciation rate needed to make the current capital-labor efficiency ratio consistent with steady-state?
   d. If the economy is currently in a steady-state, is it also at the Golden Rule level of capital accumulation? If not, what policies could be pursued to reach the Golden Rule?

29. (a) In studying the behavior of growth in different economies, Nicholas Kaldor documented several common characteristics; this observation was instrumental in shaping Robert Solow's theory of growth. Describe three of Kaldor's stylized facts.
   (b) In a Solow growth model that includes population growth but does not include technological progress, which of the facts listed in (a) are consistent with steady-state equilibrium.

30. In the country of Ecotopia, the velocity of money is constant. Real GDP grows by 5 percent per year, the money stock grows by 14 percent per year, and the nominal interest rate is 11 percent. What is the real interest rate?

31. Some economic historians have noted that during the period of the gold standard, gold discoveries were most likely to occur after a long deflation. Why might this be true? (A good answer will support the reasoning with a numerical answer.)

32. The residents of a certain dormitory have collected the following data: People who live in the dorm can be classified as either involved in a relationship or uninvolved. Among involved people, 10% experience a breakup of their relationship every month. Among uninvolved people, 5% will enter into a relationship every month. What is the steady-state fraction of residents who are uninvolved?

33. Suppose an economy described by the Solow model is in a steady state with population growth \( n \) of 1.0% per year and technological progress \( g \) of 2.0% per year. If output grows by 3.0% per year and capital’s share of output is 30%, what is the contribution of labor, capital and total factor productivity growth to total output growth?
Part II --- Second Part of Course (Not on midterm)

34. Is the following statement true or false: Suppose two countries have identical preferences and technology. The stick-wage model and imperfect information models of aggregate supply (AS) imply that the slopes of the AS curve must be the same in both economies.

35. Answer the following questions with respect to the aggregate (AD) curve:
   a. What is the AD curve?
   b. Which markets are in equilibrium along a particular AD curve?
   c. What is being held constant along the AD curve?
   d. Why does the AD curve typically have a negative slope?
   e. Are there any conditions which would make the AD curve vertical?

36. Analyze the following statement: "The cyclical behavior of the consumption of non-durables to that of the consumption of durable goods provides strong evidence for the permanent income hypothesis.

37. Suppose that the demand for money was not sensitive to interest rates. That is, money demand was entirely transactions based. What is the shape of the LM curve in this case? What variables affect the location of the AD curve?

38. Suppose the following equations describe an economy. C, I, G, T and Y are all measured in billions of dollars and r is measured as a percent (e.g. r = 10 = 10%).

   \[ C = 170 + 0.6 \times (Y - T). \]
   \[ T = 200. \]
   \[ I = 400 - 4 \times r. \]
   \[ G = 350. \]
   \[ L = 0.75 \times Y - 6 \times r. \text{ (money demand)} \]
   \[ (M/P) = 735. \]

   a. Derive the equation for the IS curve.
   b. Derive the equation for the LM curve.
   c. What determines the location and slopes of both curves.
   d. Determine equilibrium r and Y for this economy.
   e. Derive the AD equation.

39. Based on the sticky-wage model of AS, what is the implication for the cyclical behavior of the real wage?

40. Within the sticky-wage model, how is the nominal wage determined? How is the quantity of labor hired determined? Derive graphically the AS curve in this model.

41. Consider the following assumptions: Suppose the production function is \( Y = 100L^{0.5} \) and full employment is 100 units of labor. Suppose everyone in the economy expects the price level to be $1. Using the assumptions of the sticky-wage model, answer the following questions:
   a. What is the nominal wage?
   b. Derive the AS curve.
42. Using the imperfect-information model of AS, answer the following
   a. What are the sources of uncertainty in this model?
   b. What determines the slope of the AS curve?

43. Define *rational expectations*.

44. What is the *policy irrelevance theorem*?

45. Does the classical model exhibit neutrality? Explain and use graphs to support your answer.

46. In 1968, Congress passed a temporary surcharge on the personal income tax that raised taxes by 10%. The purpose was to restrict household consumption temporarily in order to offset the increased government expenditures due to the Vietnam War. Similarly, in 1974 at the trough of the recession, President Ford’s administration pushed for a tax rebate and social security bonus in order to stimulate consumption demand. Predict the effects of these policies.

47. Real business cycle models state that the primary cause of business cycles are shocks to productivity. Explain how movements in factor prices could be used to test this theory.

48. Define the nominal and real government deficits. Describe how the government’s method for calculating the real deficit is incorrect in environments with a changing price level. Under what conditions does the government's measure understate the real deficit?

49. According to the traditional view, how does a debt-financed tax cut affect public saving, private saving, and national saving?

50. According to the Ricardian view, how does a debt-financed tax cut affect public saving, private saving, and national saving?

51. Describe the evidence that was consistent with Keynes' conjectures of consumption behavior and the evidence that was inconsistent with them. How did Milton Friedman's permanent income hypothesis reconcile the two sets of data.

52. Define countercyclical, procyclical, amplitude, and frequency as used in the context of business cycle theory. Use examples to illustrate your definitions.

53. Suppose taxes are proportional to income. How does this affect the slope of the IS curve?
54. In the graphs below, describe the conditions that exist in the goods and money markets at points A and B:

55. If the demand for investment is highly interest elastic, what does this imply about the economy's underlying production function?

56. Based on IS-LM analysis, what mix of fiscal and monetary policies would you use in order to stimulate the economy given its current condition. Defend your choices.

57. During the recent presidential campaign, candidates of both parties advocated various tax policies in order to stimulate investment. Under the assumption that these policies can be thought of as increasing the productivity to capital (i.e. the after-tax return to capital), answer the following questions:
   a. Will this policy affect the current level of GNP?
   b. Will this policy affect the growth characteristics of GNP?

58. Some economists believe that the large government deficits in the U.S. during the 1980's were the cause of high real interest rates experienced at that time. Is this reasoning consistent with the IS-LM framework?

59. Do you agree with Milton Friedman's dictum that "Inflation is always and everywhere a monetary phenomenon?"

60. Your numerous visits to Oprah, Geraldo, and Donahue have resulted in widespread recognition of your vast knowledge of economics. Hoping to benefit from your popularity, the President appoints you to a special counsel whose task is the elimination of all unemployment. In your first press conference you explain, much to the President's chagrin, that this goal is undesirable. Why?

61. In order to describe economic fluctuations, Keynes thought it necessary to depart from models that exhibit the classical dichotomy. What does this mean and what aspect of Keynesian analysis reflects this departure?

62. Suppose two firms, Acme and Triple X, produce in a perfectly competitive industry, have identical technology and hire employees that have identical preferences over labor and leisure. However, due to organizational differences, the costs of monitoring workers' effort is higher in Triple X. Based on efficiency wage theory, which company will pay higher wages?

63. Based on the Fisher relation and the quantity theory, what is the predicted correlation between nominal interest rates and money growth? Is this the same as in an IS-LM framework?

64. Define time inconsistency.
65. Analyze the following statement: "There is no doubt that reducing the government deficit should be the top economic priority of any administration."

66. While in office, President Clinton proposed a deficit reduction plan in which income tax rates are, on average, increased. Using an IS-LM framework, what will this do to the ability of changes in government expenditures to influence GNP?

67. Compare the mechanisms by which fiscal and monetary policy influence GNP. Why do some economists have greater reliance on the effectiveness of fiscal policy.

68. Suppose the economy's production function is \( y = k^\alpha \) and suppose the depreciation rate (\( \delta \)) is zero. Using the condition associated with investment demand, i.e. \( MPK = r \), prove that the interest rate elasticity of investment demand is positively related to \( \alpha \). (hint: take natural logs)