Intermediate Macroeconomic Theory / Macroeconomic Analysis (ECON 3560/5040) Midterm Exam

Part A (15 points)

State whether you think each of the following questions is true (T), false (F), or uncertain (U) and briefly explain your answer. No credit will be given for an answer without any explanation.

(1) [5 points] An increase in the price of imported goods will show up in the GDP deflator but not in the CPI.

(2) [5 points] The concept of monetary neutrality in the classical model means that an increase in the money supply will increase both saving and investment by the same amount.

(3) [5 points] Someday we will live in a “cashless society” in which all businesses and banks will be linked to a centralized accounting system. In the cashless society, there would be no expected inflation costs.

Part B (12 points) Fill-in Questions

(1) [3 points] Macroeconomics is the study of the economy as a whole. It focuses on issues such as _________________, _________________, and _________________.

(2) [3 points] If a firm hires an additional unit of labor while keeping other inputs constant, its production increases by the _________________.

(3) [3 points] _________________ theories, another cause of wage rigidity, suggest that higher wages make workers more productive. Unemployment

(4) [3 points] The interest rate banks pay to depositors is called the nominal interest rate. According to the Fisher equation, it is equal to the real interest rate plus _________________.
Table 1: The Reagan Deficits

<table>
<thead>
<tr>
<th>variable</th>
<th>1970s</th>
<th>1980s</th>
<th>actual change</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>19.6</td>
<td>17.4</td>
<td>↓</td>
</tr>
<tr>
<td>I</td>
<td>19.9</td>
<td>19.4</td>
<td>no change</td>
</tr>
<tr>
<td>r</td>
<td>1.1</td>
<td>6.3</td>
<td>↑</td>
</tr>
</tbody>
</table>

Data: decade averages; all except r are expressed as a percent of GDP

Part C (73 points)

(1) [15 points] Classical Model

Assume that real GDP (Y) is 1,200. Consumption (C) is given by the equation \( C = 125 + 0.75(Y - T) \). Investment (I) is given by the equation \( I = 200 - 10r \), where r is the real interest rate in percent. Taxes (T) are 100 and government spending (G) is 150.

(a) [3 points] What is the equilibrium value of r?

(b) [3 points] What are the equilibrium values of C and I?

(c) [3 points] Now assume government purchases increase by 50 to 200. What are the new equilibrium values of C, I, and r?

(d) [3 points] Now assume that we start again at \( G = 150 \). Suppose a government education program succeeds in getting households to save more. It lowers marginal propensity consume (MPC) to 0.60. What is the new equilibrium value of r?

(e) [3 points] Suppose that both government purchases (G) and taxes (T) increase by 100. Is r increasing or decreasing? Briefly explain.

(2) [10 points] Classical Model in the Long Run

Use the Classical Model to answer the following questions. Be sure to label: i) the axes; ii) the curves; iii) the initial equilibrium values; iv) the direction curves shift; and v) the terminal equilibrium values.

(a) [6 points] During early 1980s, President Reagan proposed to increase defense spending and decrease taxes. Table 1 shows how the policies affected the U.S. economy. Use the classical model and illustrate graphically how the model predicts national saving (S), investment (I), and real interest rate (r) in the long run.
(3) [18 points] **Solow-Swan Growth Theory**

Use the Solow-Swan growth model to answer the following questions. Be sure to label: i) the axes; ii) the curves; iii) the initial equilibrium values; iv) the direction curves shift; and v) the terminal equilibrium values.

### Case I: Growing Population and No Technological Progress

Suppose that two countries are exactly alike in every respect except that population grows at a faster rate in country A than in country B. That is, the population growth rate in country A is 3% per year \( n_A = 3\% \) and the population growth rate in country B is 1% per year \( n_B = 1\% \).

(a) [4 points] Which country will have the higher level of output per worker in the steady state? Illustrate graphically.

(b) [3 points] What is the rate of growth of output per worker \( \frac{y}{Y/L} \) in country B?

(c) [3 points] What is the rate of growth of output \( Y \) in country A?

### Case II: Growing Population and Technological Progress

Consider a hypothetical economy. Suppose that marginal product of capital \( MPK \) is 5 percent per year, depreciation rate is 2 percent per year \( \delta = 0.02 \), population growth rate is 1 percent per year \( n = 0.01 \), and the economy’s real GDP growth rate is 3 percent per year.

(d) [4 points] Let’s assume that the economy is in a steady state. Let \( A \) be the efficiency of labor or a society’s knowledge about production method. What is the rate of growth of efficiency of labor \( g \)?

(e) [4 points] Is the steady-state capital per worker at, below, or above the Golden Rule level of capital per worker, \( k_g \)?

(4) [8 points] **Money and Inflation**

Answer the following questions.

(a) [4 points] According to the Fisher equation, if the Fed announces that it will raise the money supply in the future but does not change the money supply today, then what happens to nominal interest rate?
(b) [4 points] Suppose velocity is constant and, in addition, the factors of production and the production function determine real GDP. If the money supply increases 8 percent and the price level increases 5 percent, then what is the change in nominal GDP and real GDP?

(5) [8 points] Unemployment
Let’s assume that supply of labor is fixed in the long run, and thus the labor supply curve is vertical. Suppose that a country experiences a reduction in productivity that lowers the marginal productivity of labor for any given level of labor.

(a) [4 points] Suppose the labor market were always in equilibrium. Illustrate graphically the effects of the reduction in productivity on real wage and unemployment.

(b) [4 points] Will your answer in part (b) change if the real wage were rigid? Briefly discuss.

(6) [14 points] Short-run Economic Fluctuations
Assume that the long-run aggregate supply curve is vertical at $Y = 3,000$ while the short-run aggregate supply curve is horizontal at $P = 1.0$. The aggregate demand curve is $Y = 3(M/P)$ and $M = 1,000$.

(a) [2 points] If the economy is initially in long-run equilibrium, what are the values of $P$ and $Y$?

(b) [2 points] Now suppose a supply shock moves the short-run aggregate supply curve to $P = 1.5$. What are the new short-run equilibrium values of $P$ and $Y$?

(c) [3 points] If the aggregate demand curve and long-run aggregate supply curve are unchanged, what are the long-run equilibrium values of $P$ and $Y$ after the supply shock?

(d) [4 points] You are an economist working for the Federal Reserve. Use the aggregate demand-aggregate supply model to illustrate graphically your policy recommendation to accommodate this supply shock, assuming that your top priority is maintaining full employment in the economy. Should money supply ($M$) be increased or decreased? Why?

(e) [3 points] Suppose that after the supply shock the Fed wanted to hold output at its long-run level. What level of $M$ would be required?