Final Exam

Tuesday, December 16

1 hour, 30 minutes

Name: ___________________________________

Student ID: _______________________________

Instructions

1. This is closed book, closed notes exam.
2. No calculators or electronic devices of any kind are allowed.
3. Show all the steps and calculations.
4. If you need more space, use the back of the page.
5. Fully label all graphs.
6. Use a ruler to draw neat graphs.
7. The last page contains a few formulas.

Good Luck 😊
1. (12 points). Two countries produce pizza (X) and salads (Y). The time required for an average worker to produce one unit of each good is given in the next table.

<table>
<thead>
<tr>
<th>Country</th>
<th>Time required (in hours) to make one unit</th>
<th>Opportunity cost of one unit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>A</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>15</td>
</tr>
</tbody>
</table>

a. Calculate the opportunity costs of X and Y for each country, and complete the above table. Show your steps.

b. Which country has **absolute** advantage in X? In Y?

_____A_____ has absolute advantage in X and _____A______ has absolute advantage in Y.

c. Which country has **comparative** advantage in X? In Y?

_____B______ has comparative advantage in X and _____A______ has comparative advantage in Y.

d. Both countries can gain from trade if _____A_____ switches resources from X to Y and _____B______ switches resources from Y to X.

2. (3 points). Circle the correct statement about economics and economists.

a. Economists assume that all people act in a random and unpredictable manner.

b. Economists assume that people respond to incentives.

c. Economists assume that all markets are efficient.

d. Economists assume that all people are selfish.
3. (10 points). The next table provides nominal GDP, price level (GDP deflator) and population for some economy in the years 2013, 2014.

<table>
<thead>
<tr>
<th>Year</th>
<th>Nominal GDP</th>
<th>Price Level</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>1000</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>2014</td>
<td>1080</td>
<td>105</td>
<td>204</td>
</tr>
</tbody>
</table>

a. Calculate the growth rate of nominal GDP, the inflation rate and population growth rate between the years 2013 and 2014, in %. Show your steps.

\[
\%\Delta GDP = \frac{GDP_{2014} - GDP_{2013}}{GDP_{2013}} = \frac{1080 - 1000}{1000} = \frac{80}{100} = \frac{8}{100} = 8\%
\]

\[
\text{inf} = \%\Delta \text{Prices} = \frac{P_{2014} - P_{2013}}{P_{2014}} = \frac{105 - 100}{100} = \frac{5}{100} = 5\%
\]

\[
\%\Delta \text{POP} = \frac{POP_{2014} - POP_{2013}}{POP_{2013}} = \frac{204 - 200}{200} = \frac{4}{200} = \frac{2}{100} = 2\%
\]

b. Calculate the approximate growth rate in standard of living between the years 2013 and 2014, in %.

\[
\%\Delta \left( \frac{RGDP}{POP} \right) \approx \%\Delta GDP - \%\Delta \text{Prices} - \%\Delta \text{POP} = 8\% - 5\% - 2\% = 1\%
\]

c. Using the rule of 70, approximately how many years will it take for the standard of living in this economy to double?

\[
t = \frac{70}{1} = 70 \text{ years}
\]
4. (6 points). How would the following transactions be recorded in the U.S. GDP?
   a. A person in the U.S. buys an imported car (circle all the correct categories):
      \[ C, I, G, X, IM \]
   
   b. A family buys a new house in the U.S. (circle all the correct categories):
      \[ C, I, G, X, IM \]
   
   c. Saudi Arabia buys Boeing aircraft manufactured in the U.S. (circle all the correct categories):
      \[ C, I, G, X, IM \]
   
   d. U.S. government buys aircraft manufactured in Great Britain (circle all the correct categories):
      \[ C, I, G, X, IM \]
5. (12 points). The following table contains data from the labor market of some country (in millions).

<table>
<thead>
<tr>
<th>Civilian noninstitutional population</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civilian labor force</td>
<td>90</td>
</tr>
<tr>
<td>Employed</td>
<td>81</td>
</tr>
<tr>
<td>Unemployed</td>
<td>9</td>
</tr>
<tr>
<td>Not in the labor force</td>
<td>30</td>
</tr>
</tbody>
</table>

   a. Complete the above table.
   b. Find the unemployment rate in this country. Express your answer in %.

\[
\text{Unemp. Rate} = \frac{\#\text{Unep}}{\#\text{Labor Force}} = \frac{9}{90} = 0.1 = 10\%
\]

c. Find the labor force participation rate in this country. Express your answer in %.

\[
\text{Labor Force Participation rate} = \frac{\#\text{Labor Force}}{\#\text{Civilian Noninst. Pop.}} = \frac{90}{120} = \frac{3}{4} = 75\%
\]

d. When the economy is at full employment (circle the correct answer):
   i. The unemployment rate is zero
   ii. The only type of unemployment is cyclical
   iii. The only types of unemployment are frictional, and structural
   iv. The only types of unemployment are cyclical and structural
6. (12 points). Consumer Price Index (CPI) at the end of 2013 was 200, and at the end of 2014 the CPI was 208.
   a. Calculate the inflation rate in 2014.

\[
\text{inf} = \frac{CPI_{2014} - CPI_{2013}}{CPI_{2013}} = \frac{208 - 200}{200} = \frac{8}{200} = \frac{4}{100} = 4\%
\]

b. Suppose that nominal interest rate in 2014 is 3%. Find the approximate real interest rate in 2014.

\[
r \approx i - \pi = 3\% - 4\% = -1\%
\]

c. Suppose that David earned $20,800 in 2014 and his father earned $10,000 in 1984, when CPI was 100. Who earned higher real wage, David or his father?

Comparing the purchasing power of the two salaries:

\[
\frac{10,000}{100} = \frac{20,800}{208} = 100
\]

Thus, David and his father earned the same real wage.
7. (6 points). Using a fully labeled diagram of the loanable funds market, illustrate the effect of a decrease in investors’ confidence. Clearly indicate what happens to the equilibrium real interest rate and to equilibrium saving and investment.

Loanable funds market

Initial equilibrium is at point $A$ and the new equilibrium is at point $B$. The real interest rate, saving and investment, all decline as a result of the decrease in demand for loanable funds.

8. (3 points). Calculate the interest rate on a bond that trades at $95 and has face value of $100. Write the formula that you would plug in a calculator, without providing the final answer.

\[ i = \frac{FV - P}{P} = \frac{100 - 95}{95} = \frac{5}{95} \approx 5\% \]

9. (2 points). When the price of a bond decreases, the interest rate on the bond increases/decreases (circle the correct answer).
10. (12 points). Using the AS-AD model,
   a. Illustrate, with a fully labeled diagram, an economy in full employment. Label the initial equilibrium with “a”.
   
   ![AS-AD Diagram]
   
   a. The initial equilibrium at point $a$, with full employment: $u_1 = u^*$. 
   b. The new short-run equilibrium is at point $b$, with lower price level, lower output and higher unemployment rate: $u_2 > u^*$. 
   c. In the long run, prices of inputs adjust, and in particular wages decline. As a result, SRAS increases. At the new equilibrium, at point $c$, the price level declines further (to $P_3^*$), and full employment output is restored ($Y_1^*$ and $u_1 = u^*$).

   b. On the above graph illustrate the short-run effect of a decline in investment. On your graph, label the short run equilibrium with “b” and clearly indicate the effect of this event on output, price level and unemployment rate in the short run.

   c. On the above diagram, illustrate the long run equilibrium, without fiscal stimulus (self-adjustment). On your graph, label the long run equilibrium with “c” and clearly indicate the effect of this event on output, price level and unemployment rate in the short run.

11. (3 points). Suppose that an economy is in recession, and the equilibrium output is below the full employment output by 400. The government wants to restore full employment by increasing its spending. If the government expenditure multiplier is 2, what should be the size of the fiscal stimulus which will end the recession and will restore full employment?

   $$\Delta Y = m^s \cdot \Delta G$$
   $$400 = 2 \cdot \Delta G$$
   $$\Rightarrow \Delta G = \frac{400}{2} = 200$$
12. (6 points). Suppose that the federal income tax brackets are given in the table below.

<table>
<thead>
<tr>
<th>Taxable income</th>
<th>Tax rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10,000</td>
<td>10%</td>
</tr>
<tr>
<td>10,001-60,000</td>
<td>20%</td>
</tr>
<tr>
<td>60,001 and over</td>
<td>50%</td>
</tr>
</tbody>
</table>

a. Calculate the income tax liability and average tax rate (in %) of a taxpayer with taxable income of $100,000.

The first $10,000 are taxed at 10%, the next $50,000 are taxed at 20% and the remaining $40,000 are taxed at 50%. Therefore,

\[
\text{Tax} = 10,000 \cdot 0.1 + 50,000 \cdot 0.2 + 40,000 \cdot 0.5 = 1,000 + 10,000 + 20,000 = $31,000
\]

\[
\text{Av.Tax.Rate} = \frac{31,000}{100,000} = 31\%
\]

b. The above tax brackets describe a progressive tax system. True/false, circle the correct answer and explain briefly how you reached your conclusion.

The average tax rate is decreasing in income.
Also acceptable answer: The marginal tax rate is decreasing in income.
Explanation: Higher income taxpayers, will have more income in the higher tax brackets, and therefore will pay more tax on average.

13. (3 points). Circle the correct statement about the government deficit and national debt in the U.S.

a. The United States generally has a budget surplus in the last 30 years.

b. The debt is the cumulative sum of all unpaid deficits from the past.

c. National debt is always equal to the government deficit.

d. A deficit occurs when revenues exceed outlays.
14. (3 points). Suppose that an economy has the following Laffer curve, describing the relationship between the average tax rate in the economy and government tax revenue.

![Laffer Curve Image]

Circle the correct statement:

a. It is impossible to increase tax revenue by lowering the average tax rate.
b. If the average tax rate is 50%, it is possible to increase tax revenue by increasing the tax rate.
c. If the average tax rate is 30%, it is possible to increase tax revenue by lowering the tax rate.

D) If the average tax rate is 50%, it is possible to increase tax revenue by lowering the tax rate.
15. (10 points). Suppose that the required reserve/deposit ratio is \( rd = 0.2 \). The initial consolidated balance sheet of commercial banks:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>( R = )</td>
<td>( D = 100 )</td>
<td>( R = 20 )</td>
<td>( D = 100 )</td>
</tr>
<tr>
<td>( Sec = 15 )</td>
<td>( E = 10 )</td>
<td>Completed:</td>
<td>( Sec = 15 )</td>
</tr>
<tr>
<td>( L = )</td>
<td></td>
<td></td>
<td>( L = 75 )</td>
</tr>
<tr>
<td>( = 110 )</td>
<td>110</td>
<td>110</td>
<td></td>
</tr>
</tbody>
</table>

Where \( R \) is reserves, \( D \) is demand deposits, \( Sec \) are government securities, \( L \) denotes loans, and \( E \) denotes the shareholder's equity (capital). Assume that commercial banks always hold exactly the required reserves.

a. Find the banks' reserves.

\[
R = rd \cdot D = 0.2 \cdot 100 = 20
\]
\[
L = 110 - R - Sec = 65 \quad \text{(Not required)}
\]

b. Find the simple money multiplier.

\[
m^m = \frac{1}{rd} = \frac{1}{0.2} = 5
\]

c. Suppose the Fed buys government securities from the commercial banks at the amount of 5, and pays with new cash. Calculate the change in the money supply that results from this monetary policy.

\[
\Delta M = m^m \cdot \Delta MB = 5 \cdot 5 = 25
\]
Formulas

I. NIPA:
   1. GDP expenditure approach: \( GDP = C + I + G + \frac{X - IM}{NX} \)

II. Money:
   1. \( MB = CU + R \) (monetary base)
   2. \( M = CU + D \) (money supply)
   3. \( mm = \frac{1}{rd} \) (simple money multiplier)