Please sign the following oath:

The answers on this test are entirely my own work. I neither gave nor received any aid while taking this test. I will not discuss the questions on this test until after 3:30 p.m. on December 20, 2008.

__________________________________
Signature

Any test turned in without a signature indicating that you have taken this oath will be assigned a grade of zero.

Graph Instructions

When drawing diagrams, the following rules apply:

1. Completely, clearly and accurately label all axes, lines, curves, and equilibrium points.
2. The original diagram and any equilibrium points MUST be drawn in black or pencil.
3. The first change in any variable, curve, or line and any new equilibrium points MUST be drawn in red.
4. The second change in any variable, curve, or line and any new equilibrium points MUST be drawn in blue.
5. The third change in any variable, curve, or line and any new equilibrium points MUST be drawn in green.

Do NOT open this test until instructed to do so.

Good Luck!
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A. Multiple Choice Questions. Circle the letter corresponding to the best answer. (3 points each; total of 30 points.)

1. The Phillips curve is the relation between inflation and unemployment that holds for a given natural rate of unemployment and a:
   a. Given rate of inflation.
   b. **Given expected rate of inflation.**
   c. Given level of unemployment.
   d. Given expected level of unemployment.

2. Under an assumption of monetary neutrality, a change in the growth rate of the nominal money supply has:
   a. No effect on the inflation rate.
   b. A less than proportional effect on the inflation rate.
   c. **A proportional effect on the inflation rate.**
   d. A more than proportional effect on the inflation rate.

3. Suppose that the economy is initially at its full-employment output level. Subsequently, a decrease in the money supply combined with an increase in the government’s structural budget balance would have all of the following effects EXCEPT:
   a. Inflation will be lower in the long run.
   b. The real interest rate will be lower in the long run.
   c. Investment will be higher in the long run.
   **d. Unemployment will be higher in the long run.**

4. Suppose that the central bank adopts an inflation target, i.e., it commits to keeping inflation at a fixed rate and doing whatever is necessary to prevent deviations from that target. If inflation is currently at its target value and there is a favorable productivity shock, then the central bank should:
   a. **Increase the money supply.**
   b. Reduce the money supply.
   c. Increase government purchases.
   d. Decrease government purchases.

5. According to real business cycle theory, prices are completely flexible. This, if this theory is correct, a large fiscal expansion would:
   a. Have no effect on inflation.
   b. Not shift the DAD curve.
   **c. Have no effect on output.**
   d. Have no effect on real interest rates.
6. For a given real exchange rate, a nominal appreciation of the domestic currency will result from:
   a. An increase in the prices of foreign goods or an increase in the prices of domestic goods.
   b. A decrease in the prices of foreign goods or an increase in the prices of domestic goods.
   c. An increase in the prices of foreign goods or a decrease in the prices of domestic goods. \(\text{Correct Answer} \)
   d. A decrease in the prices of foreign goods or a decrease in the prices of domestic goods.

7. Suppose the euro/yen exchange rate falls while the dollar/yen exchange rate rises. What happens to the price of goods imported into Japan?
   a. European goods become more expensive while U.S. goods become cheaper.
   b. European goods become cheaper while U.S. goods become more expensive.
   c. Both European and U.S. goods become more expensive.
   d. Both European and U.S. goods become cheaper. \(\text{Correct Answer} \)

8. Suppose that the Japanese real interest rate declines relative to the U.K. real interest rate. Then, the U.K exchange rate _______ and U.K. net exports _______.
   a. Increases; increase.
   b. Increases; decrease. \(\text{Correct Answer} \)
   c. Decreases; increase.
   d. Decreases; decrease.

9. Suppose that the Federal Reserve has just purchased bonds in the domestic financial markets through open market operations. In the short-run Keynesian model, this would cause foreign economic activity to _______ and the foreign real interest rate to _______:
   a. Increase; increase.
   b. Increase; decrease.
   c. Decrease; increase.
   d. Decrease; decrease.

10. You have just noticed that the dollar has appreciated substantially and you suspect that the U.S. government was behind this change. Which of the following would have caused the largest appreciation in the real exchange rate?
    a. An increase in the money supply.
    b. A decrease in the money supply. \(\text{Correct Answer} \)
    c. An increase in government purchases.
    d. A decrease in tax rates.
1. **DAD-SRAS Model.** Suppose that in 2007 the economy could be described by the Keynesian model, that it was in general equilibrium with an inflation rate of 3%, and that Ricardian equivalence does not hold. Assume that the adjustment process to long-term equilibrium takes 4 years, that demand shocks have a larger effect on output than any inflation or supply shocks, and that any long-run supply shock effect on full-employment output is larger than any short-run inflation shock effect on output.

In 2008, oil prices doubled, which added 2 percentage points to the inflation rate. As a result, consumers’ expected future income declined substantially.

In 2009, oil prices fell in half, which subtracted 2 percentage points from the inflation rate. As a result, consumers’ expected future income returned to its 2007 level.

a. Based only on this information, use a DAD - SRAS model diagram to **clearly and accurately show**:

   i. The economy’s output level and inflation rate in 2007 (in black),
   
   ii. The economy’s output level and inflation rate in 2008 (in red),
   
   iii. The economy’s output level and inflation rate in 2009 (in blue),
   
   iv. The economy’s output level and inflation in 2010 (in green), and
   
   v. The economy’s output level and inflation rate once general equilibrium is re-established (in black).
b. Provide a **brief economic explanation** of the economy’s initial equilibrium, of **EACH** of the changes that you have made, and of the final equilibrium that you have shown in your diagram above. Be sure to **discuss** the adjustment process that the economy undergoes with respect to economic output and inflation for **EACH** year. Also, **compare** the level of economic output, the inflation rate, and the unemployment rate between the initial and final equilibrium situations.

The economy was initially in general equilibrium with economic output at $Y_0 = Y^*$ and with a steady inflation rate of $\pi_0 = 3\%$.

**In Year 1 (2008), two things happened.**

First, oil prices doubled, adding 2 percentage points to the inflation rate. This shifted the SRAS curve up from SRAS$_0$ to SRAS$_1$ and increased inflation from $\pi_0 = 3\%$ to $\pi_1 = 5\%$. Higher inflation reduced the real money supply, increasing the real interest rate, and reducing interest-sensitive spending and economic output from $Y_0$ to $Y_{1a}$.

Second, consumers’ expected future income declined, shifting the DAD curve to the left from DAD$_0$ to DAD$_1$. This reduced economic output further from $Y_{1a}$ to $Y_1$.

**In Year 2 (2009), three things happened.**

First, because $Y_1 < Y^*$, the SRAS curve shifts down from SRAS$_1$ to SRAS$_{2a}$ and inflation declines from $\pi_1 = 5\%$ to $\pi_{2a} < 5\%$. Lower inflation increases the real money supply, decreasing the real interest rate, and increasing interest-sensitive spending and economic output from $Y_1$ to $Y_{2a}$.

Second, oil prices fell in half, subtracting 2 percentage points from the inflation rate. This shifted the SRAS curve down from SRAS$_{2a}$ to SRAS$_{2b} < $SRAS$_0$ and inflation declines from $\pi_{2a}$ to $\pi_2 < \pi_0 = 3\%$. Lower inflation increases the real money supply, decreasing the real interest rate, and increasing interest-sensitive spending and economic output from $Y_{2a}$ to $Y_{2b}$.

Third, consumers’ expected future income returned to its 2007 level, increasing desired consumption and shifting the DAD curve to the right from DAD$_1$ to DAD$_2 = $DAD$_0$. This increases economic output from $Y_{2b}$ to $Y_2 > Y^*$.

**In Year 3 (2010), because $Y_2 > Y^*$, the SRAS curve shifts up from SRAS$_2$ to SRAS$_1$ and inflation increase from $\pi_2$ to $\pi_3$. Higher inflation decreases the real money supply, increasing the real interest rate, and decreasing interest-sensitive spending and economic output from $Y_2$ to $Y_3$.

This process continues until the economy returns to general equilibrium with economic output at $Y_0 = Y^*$ and with inflation back at $\pi_0 = 3\%$. Because the economy started and finished in general equilibrium, the unemployment rate will be unchanged at the natural rate of unemployment.
2. **Open Economy IS – LM Model.** Argentina and Brazil are major trading partners. Assume that both economies are in general equilibrium, can be described by the Keynesian model, that Ricardian equivalence does not hold, and that changes in economic output from domestic events are greater than from international events.

Now suppose that Brazil experiences a sharp decline in the expected future marginal product of capital at the same time that Argentina reduced its tax rates significantly. In reaction to these events, the Brazilian central bank immediately responds to keep Brazilian economic output at its full-employment level.

**a.** Based only on this information, use a 2-country, open economy IS – LM diagram with a Foreign Exchange Market diagram (for the Argentine peso) to clearly and accurately show:

i. The initial general equilibrium situation in both countries and the foreign exchange market (in black),

ii. The short-run effects on economic output and the real interest rate in both Argentina and Brazil and on the Argentine peso exchange rate of these events (in red and blue as needed).
b. Provide a brief economic explanation of the changes you have shown in your diagram above. Be sure to compare the level of economic output, the real interest rate, and the exchange rate between the initial equilibrium and the new short-term equilibrium that exists in each country after Brazil’s monetary contraction.

The Argentine economy began in general equilibrium with economic output at $Y_0$, which is equal to its full-employment level of output, i.e., $Y_0 = Y^*$, and with the real interest rate at $r_0$.

The Brazilian economy also began in general equilibrium with economic output at $Y_0$, which is equal to its full-employment level of output, i.e., $Y_0 = Y^*$, and with the real interest rate at $r_0$.

With flexible exchange rates, the equilibrium exchange rate was equal to its initial fundamental value at $e_{nom0}$.

Now Brazil experiences a sharp decline in the expected future marginal product of capital. This would shift the Brazilian IS curve to the left from $IS_0$ to $IS_1$, reducing Brazilian economic output and the real interest rate.

However, the Brazilian central bank responded immediately to keep the Brazilian economy at its full-employment level of output. This would shift the LM curve to the right from $LM_0$ to $LM_1$, keeping Brazilian economic output at $Y_0$ but reducing the real interest rate from $r_0$ to $r_1$.

At the same time, Argentina reduced its tax rates significantly. This would shift the Argentine IS curve to the right from $IS_0$ to $IS_1$, increasing Argentine economic output from $Y_0$ to $Y_1$ and raising the real interest rate from $r_0$ to $r_1$.

The increase in Argentine economic output would also increase Argentine imports or Brazilian exports. This would shift the Brazilian IS curve to the right from $IS_1$ to $IS_2$, increasing economic output and the real interest rate.

However, the Brazilian central bank responded immediately to keep the Brazilian economy at its full-employment output level. This would shift the LM curve to the left from $LM_1$ to $LM_2$, keeping Brazilian economic output at $Y_0$ and raising the real interest rate from $r_1$ to $r_2$.

After these events, the Brazilian economy was in general equilibrium with economic output at $Y_0 = Y^*$ but with a lower real interest rate at $r_1$, i.e., $r_1 < r_0$. The Argentine economy was in short-term equilibrium with economic output at $Y_1 > Y^*$ and the real interest rate at $r_1 > r_0$.

In the foreign exchange market, the higher real interest rate in Argentina (and lower real interest rate in Brazil) will increase the demand for, and reduce the supply of, the Argentine peso because peso-denominated assets have become (relatively) more attractive. This shifts the demand curve for pesos to the right from $D_0$ to $D_1$ and shifts the supply curve for pesos to the left from $S_0$ to $S_1$. In addition, the increase in Argentine economic output shifts the supply curve of pesos to the right from $S_1$ to $S_2$. As a result of these changes, the Argentine peso appreciates from $e_{nom0}$ to $e_{nom1}$.

The appreciation of the Argentine peso reduces net exports in Argentina, shift the Argentine IS curve to the left from $IS_1$ to $IS_2$, which reduces the Argentine economic output from $Y_1$ to $Y_2$ and the real interest rate from $r_1$ to $r_2$.

In addition, the depreciation of the Brazilian real increases net exports in Brazil, shifting the Brazilian IS curve to the right from $IS_2$ to $IS_3$, causing the Brazilian central bank to reduce the money supply, shifting the LM curve to the left from $LM_2$ to $LM_3$. This leaves Brazilian economic output at $Y_0$ and raises the real interest rate from $r_2$ to $r_3$. 
c. Now suppose that Argentina had fixed its currency, the Argentine peso, to the Brazilian currency, the Brazilian real, at its fundamental value at the initial exchange rate.

   i. In your diagrams above, clearly and accurately show the monetary policy change that the Argentine central bank has to implement to maintain the fixed exchange rate (in green).

   ii. Describe exactly how the Argentine central bank must respond in order to maintain the fixed exchange rate.

      If Argentina had fixed its exchange rate at its initial fundamental value, then the official rate would be $e_{nom0}$.

      After the events described above, the Argentine peso would have appreciated and the peso would be overvalued. Therefore, in order to fix the exchange rate at its official rate of $e_{nom0}$, the Argentine central bank would have to enter the foreign exchange market, buying Brazilian reals in exchange for supplying more Argentine pesos. This would increase the Argentine money supply and shift the Argentine LM curve from $LM_0$ to $LM_3$.

      As a result of this increase in the Argentine money supply, Argentine economic output would increase from $Y_2$ to $Y_3$ which increases the demand for imports and the supply of Argentine pesos in the foreign exchange market. In addition, the Argentine real interest rate would decrease, making peso-denominated assets less attractive, which would reduce the demand for pesos and increase the supply of pesos in the foreign exchange market. These changes would cause the exchange value of the Argentine peso to depreciate. Managed correctly, the Argentine central bank can achieve an exchange rate at its official rate of $e_{nom0}$.

iii. Discuss what happens to Argentina’s economic output and real interest rate in the short-run assuming that Argentina is successful in maintaining the fixed exchange rate.

      Argentina’s economic output will have increased from $Y_2$ to $Y_3$ and its real interest rate will have decreased from $r_2$ to $r_3$.  