ECON 3010 Intermediate Macroeconomics
Solutions to Exam #1

Multiple Choice Questions. (25 points; 2.5 pts each)

#1. A severe recession is called a(n):

a. deflation.
b. market-clearing assumption.
c. depression.
d. exogenous event.

#2. The statistic used by economists to measure the value of economic output is:

a. the CPI.
b. GDP.
c. the GDP deflator.
d. the unemployment rate.

#3. All of the following are a flow except:

a. the number of new automobile purchases.
b. the government debt.
c. business expenditures on plant and equipment.
d. the number of people losing their jobs.

#4. The labor-force participation rate is the percentage of the:

a. labor force that is employed.
b. labor force that is unemployed.
c. adult population that is in the labor force.
d. adult population that is employed.

#5. In the classical model with fixed income, if households want to save more than firms want to invest, then:

a. output falls.
b. the interest rate rises.
c. the interest rate falls.
d. output increases.
#6. Assume that equilibrium GDP (Y) is 5,000. Consumption (C) is given by the equation \( C = 500 + 0.6Y \). No government exists. In this case, equilibrium investment is:

a. 2,000.
b. 2,500.
c. 3,000.
d. 1,500.

#7. In the classical model with fixed income, a reduction in the gov’t budget deficit will lead to a:

a. lower real interest rate.
b. lower level of output.
c. higher level of output.
d. higher real interest rate.

#8. Liabilities of banks include:

a. loans to customers.
b. reserves.
c. demand deposits.
d. currency in the hands of the public.

#9. To increase the money multiplier, the Fed can:

a. raise the interest rate paid on reserves.
b. conduct open-market sales.
c. conduct open-market purchases.
d. lower the interest rate paid on reserves.

#10. If the nominal interest rate is 1 percent and the inflation rate is 5 percent, the real interest rate is:

a. –4 percent.
b. 6 percent.
c. 1 percent.
d. –5 percent.
# Problem Solving / Essay Questions. (75 points)

#11. (60 pts) Consider a macroeconomy that only produces two goods, A and B. The base year is 2015 and all quantities are measured in billions. Round all your answers to the nearest tenth.

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<tbody>
<tr>
<td>A</td>
<td>100</td>
<td>105</td>
<td>$20</td>
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<tr>
<td>B</td>
<td>50</td>
<td>52</td>
<td>$100</td>
<td>$105</td>
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(a) (10 pts) Calculate the real GDP (Y) growth rate in 2016.

**SOLUTION:**

- **2015 Nominal GDP** = \((100 \times 20) + (50 \times 100) = \$7000\)
- **2016 Nominal GDP** = \((105 \times 20) + (52 \times 105) = \$7560\)
- **2015 Real GDP** = \$7000
- **2016 Real GDP** = \((105 \times 20) + (52 \times 100) = \$7300\)
- **2016 Growth Rate in Real GDP** = \(\frac{\$7300 - \$7000}{\$7000} \times 100 = 4.3\%\)

(b) (10 pts) Calculate the inflation rate \((\pi)\) in 2016 using the GDP deflator.

**SOLUTION:**

- **2015 GDP Deflator** = 100
- **2016 GDP Deflator** = \(\frac{Nominal \ GDP}{Real \ GDP} \times 100 = \frac{\$7560}{\$7300} \times 100 = 103.6\%\)
- **\(\pi\)** = \(\frac{103.6 - 100}{100} \times 100 = 3.6\%\)
(c) (10 pts) The money supply (M) is $1000 in 2016. What is the velocity of money? Now assume the Fed wishes to target a \( \pi = 2\% \) inflation rate in 2017. If the growth in real GDP is expected to be the same in 2017 as in 2016, what money supply growth rate is necessary? How much new money must the Fed inject into the economy?

SOLUTION:

- The 2016 velocity of money is \( V = \frac{PY}{M} = \frac{\$7560}{\$1000} = 7.6 \).
- Using the quantity theory in percentage changes, we have \( \pi = \%\Delta M - \%\Delta Y \). Substituting the 2\% inflation target and the growth rate of \( Y \), we have \( \%\Delta M = 2 + 4.3 = 6.3\% \). The Fed must target a 6.3\% growth rate in money.
- Therefore, the Fed would need to inject $63 billion into the economy.

(d) (10 pts) Assume households hold 10\% of deposits as currency and banks are required to keep 10\% of deposits in reserve. Explain how the Federal Open Market Committee (FOMC), in practice, would hit the M target in part (c).

SOLUTION:

- The money multiplier is \( m = \frac{1+cr}{cr+rr} = \frac{1+0.1}{0.1+0.1} = \frac{1.1}{0.2} = 5.5 \).
- The FOMC would need to buy $63/5.5 = $11.3 billion of government securities. Given the multiplier effect, the $11.5 billion of new reserves would eventually lead to $63 billion in new M.
(e) (10 pts) Assume that \( G = T = 500; \ C = 1000 + 0.9(Y - T); \) and \( I = 200 - 125r. \) Calculate the equilibrium real interest rate \( (r_e) \) that clears the 2016 goods market. Show the equilibrium in a graph. What is the nominal interest rate \( (i) \)?

**SOLUTION:**

- The equilibrium condition is: \( Y = C + I + G. \)
  
  Substitution gives...

\[
7300 = 1000 + 0.9(7300 - 500) + 200 - 125r + 500
\]

\[
7300 = 7820 - 125r
\]

\[
r_e = 4.2\%
\]

- The nominal interest rate is given by the Fisher equation: \( i = r_e + \pi = 4.2 + 3.6 = 7.8\%. \)

(f) (10 pts) Prove that \( r_e \) also clears the loanable funds market in 2016. Show the equilibrium in a graph.

- The equilibrium condition is: \( S = I. \)

\[
S_{pr} + S_{pu} = I
\]

\[
Y - C - G = I
\]

\[
7300 - 7120 - 500 = 200 - 125r
\]

\[
-320 = 200 - 125r
\]

\[
125r = 520
\]

\[
r_e = 4.2\%
\]
#12. (15 pts) True or False. If “False”, correct the statement to make it true.

(a) (5 pts) “The current U.S. unemployment rate is 4.9%.”

TRUE.

(b) (5 pts) “If the production function is $Y = 10K^{0.3}L^{0.7}$, the marginal product of capital is $MPK = 10K^{-0.7}L^{0.7}$."

FALSE. The $MPK = 3K^{-0.7}L^{0.7}$.

(c) (5 pts) “Bernie Sanders’ economic plan calls for the federal government to make major investments in our national infrastructure. All else equal, the classical model in chapter 3 predicts the policy will cause real interest rates to rise and crowd out private investment.”

TRUE.