ECON 3010 Intermediate Macroeconomics
Solutions to the Final Exam

Multiple Choice Questions. (60 points; 2 pts each)

#1. A measure of how fast the general level of prices is rising is called the:

A) growth rate of real GDP.
B) unemployment rate.
C) inflation rate.
D) market-clearing rate.

#2. In the national income accounts, net exports equal:

A) exported goods minus imported goods.
B) exported goods and services minus imported goods and services.
C) exported goods minus imported services.
D) exported goods and services plus imported goods and services.

#3. To avoid double counting in the computation of GDP, only the value of _____ goods are included.

A) final
B) used
C) intermediate
D) investment

#4. In the long run, what determines the level of total production of goods and services in an economy?

A) the interest rate and the amount of national saving
B) the quantity of capital, quantity of labor, and production technology
C) consumption, investment, and government spending
D) the marginal products of capital and labor, constant returns to scale, and competition

#5. A competitive firm chooses the:

A) price at which to sell the product produced.
B) wage to pay labor.
C) quantity of labor and capital to employ.
D) rental price to pay capital.

#6. The marginal product of labor is:

A) output divided by labor input.
B) additional output produced when one additional unit of labor is added.
C) additional output produced when one additional unit of labor and one additional unit of capital are added.
D) value of additional output when one dollar's worth of additional labor is added.

#7. To reduce the money supply, the Federal Reserve:

A) buys government bonds.
B) sells government bonds.
C) creates demand deposits.
D) destroys demand deposits.

#8. The size of monetary base is determined by:

A) the Federal Reserve.
B) the Federal Reserve and banks.
C) preferences of households about the form of money they wish to hold.
D) business policies of banks and the laws regulating banks.

#9. If domestic saving exceeds domestic investment, then net exports are _____ and net capital outflows are _____.

A) positive; positive
B) positive; negative
C) negative; negative
D) negative; positive

#10. If income velocity is assumed to be constant, but no other assumptions are made, the level of _____ is determined by *M*.

A) prices
B) income
C) transactions
D) nominal GDP

#11. Net capital outflow is equal to:

A) national saving minus the trade balance.
B) domestic investment plus the trade balance.
C) domestic investment minus national saving.
D) national saving minus domestic investment.

#12. An increase in the trade surplus of a small open economy could be the result of:

A) a domestic tax cut.
B) an increase in government spending.
C) an increase in the world interest rate.
D) the implementation of an investment tax-credit provision.

#13. According to efficiency-wage theories, firms benefit by paying higher-than-equilibrium wages because worker _____ increases.

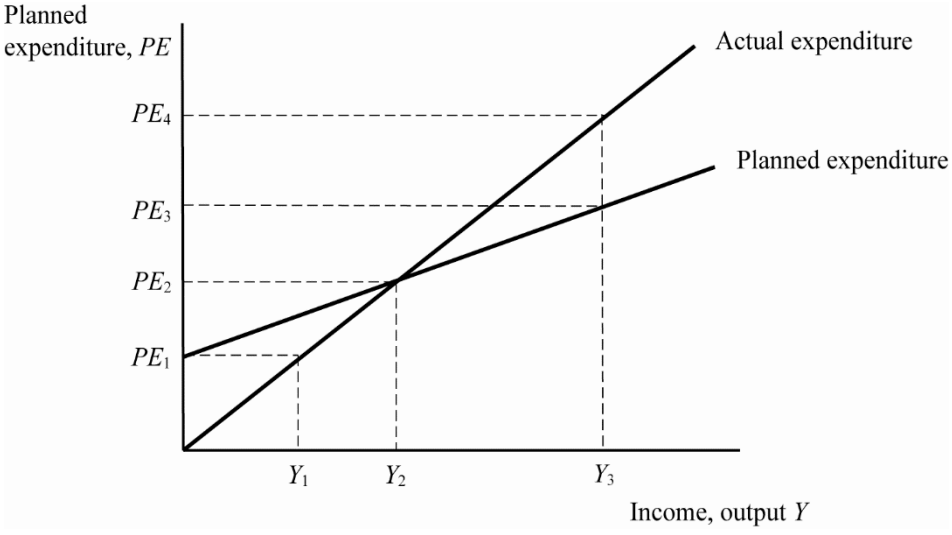
A) productivity
B) turnover
C) unionization
D) shirking

#14. Okun's law is the _____ relationship between real GDP and the _____.

A) negative; unemployment rate
B) negative; inflation rate
C) positive; unemployment rate
D) positive; inflation rate

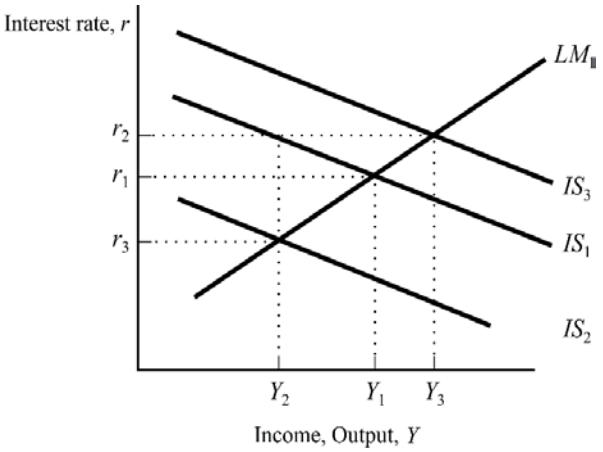
#15. Most economists believe that prices are:

A) flexible in the short run but many are sticky in the long run.
B) flexible in the long run but many are sticky in the short run.
C) sticky in both the short and long runs.
D) flexible in both the short and long runs.



#16. In the graph above, if firms are producing at level Y_1, then inventories will _____, inducing firms to _____ production.

A) rise; increase
B) rise; decrease
C) fall; increase
D) fall; decrease



#17. Based on the graph above, starting from equilibrium at interest rate r_1 and income Y_1, a tax cut would generate the new equilibrium combination of interest rate and income:

A) r_2, Y_2
B) r_3, Y_2
C) r_2, Y_3
D) r_3, Y_3

#18. Based on the graph above, starting from equilibrium at interest rate r_1 and income Y_1, a decrease in government spending would generate the new equilibrium combination of interest rate and income:

A) r_2, Y_2
B) r_3, Y_2
C) r_2, Y_3
D) r_3, Y_3

#19. A decrease in the price level shifts the ____ curve to the right, and the aggregate demand curve ____.

A) *IS*; shifts to the right
B) *IS*; does not shift
C) *LM*: shifts to the right
D) *LM*; does not shift

#20. According to the Phillips curve, other things being equal, inflation depends positively on:

A) expected inflation.
B) the unemployment rate.
C) the rate of technological change.
D) the quantities of capital and labor.

#21. If the short-run aggregate supply curve is steep, the Phillips curve will be:

A) flat.
B) steep.
C) backward-bending.
D) unrelated to the slope of the short-run aggregate supply curve.

#22. Increasing government spending when the economy is in a recession is an example of:

A) active monetary policy.
B) active fiscal policy.
C) passive monetary policy.
D) passive fiscal policy.

#23. Because monetary and fiscal lags are long and variable:

A) stronger policies must be used.
B) successful stabilization policy is completely impossible.
C) attempts to stabilize the economy are often destabilizing.
D) policy must be completely passive.

#24. The amount by which government spending exceeds government revenues is called the _____, and the accumulation of past government borrowing is called the _____.

A) deficit; debt
B) debt; deficit
C) devaluation; deflation
D) deflation; devaluation

#25. The debt of the United States government is underreported in the view of many economists because *all* of the following liabilities are excluded *except*:

A) future pensions of government employees.
B) debt owed to foreigners.
C) future Social Security benefits.
D) government guarantees of student loans.

#26. The short-run Phillips curve:

A) shifts upward if expected inflation increases.
B) shifts upward if expected inflation decreases.
C) shifts downward if expected inflation increases.
D) is vertical.

#27. In the Keynesian-cross model, actual expenditures equal:

A) GDP.
B) the money supply.
C) the supply of real balances.
D) unplanned inventory investment.

#28. In the short run an adverse supply shock causes:

A) both prices and output to rise.
B) prices to rise and output to fall.
C) prices to fall and output to rise.
D) both prices and output to fall.

#29. The natural rate of unemployment in the U.S. since 1950 has averaged between ____ and ____ percent.

A) 0; 1
B) 1; 3
C) 5; 6
D) 10; 15

#30. If a country has a high rate of inflation relative to the United States, the dollar will buy:

A) less of the foreign currency over time.
B) more of the foreign currency over time.
C) the same amount of the foreign currency over time.
D) an amount of foreign currency determined by the real exchange rate.

Problem Solving / Essay / Matching Questions. (140 points)

#31. (30 pts) Consider an economy that produces 4 goods. Unless otherwise stated, 2017 is the base year.

	Quantity		Price	
Product	2017	2018	2017	2018
A	5	7	\$30	\$40
B	6	4	\$20	\$40
C	8	12	\$15	\$20
D	3	5	\$100	\$110

(a) (15 pts) Calculate nominal and real GDP for 2017 and 2018. What is the GDP deflator in 2017 and 2018? What is the corresponding annual growth rate of the economy and the annual inflation rate?

Nominal GDP in 2017 $= (\mathbf{5} \times \mathbf{\$30}) + (\mathbf{6} \times \mathbf{\$20}) + (\mathbf{8} \times \mathbf{\$15}) + (\mathbf{3} \times \mathbf{\$100}) =$ **\$690.**

Nominal GDP in 2018 $= (\mathbf{7} \times \mathbf{\$40}) + (\mathbf{4} \times \mathbf{\$40}) + (\mathbf{12} \times \mathbf{\$20}) + (\mathbf{5} \times \mathbf{\$110}) =$ **\$1,230.**

Real GDP in 2017 = Nominal GDP in 2017.

Real GDP in 2018 $= (\mathbf{7} \times \mathbf{\$30}) + (\mathbf{4} \times \mathbf{\$20}) + (\mathbf{12} \times \mathbf{\$15}) + (\mathbf{5} \times \mathbf{\$100}) =$ **\$970.**

GDP deflator in 2017 = 100 × (Nominal GDP in 2017 / Real GDP in 2017) = 100.

GDP deflator in 2018 = 100 × (Nominal GDP in 2018 / Real GDP in 2018) $= \mathbf{100} \times \left(\frac{\mathbf{1230}}{\mathbf{970}}\right) = \mathbf{126.8}$.

Annual real GDP growth rate $= \mathbf{100} \times \left(\frac{\mathbf{970-690}}{\mathbf{690}}\right) = \mathbf{40.58}\%$

Annual GDP deflator inflation rate = $\mathbf{26.8}\%$**.**

(b) (15 pts) Assume that the typical consumer's basket of goods is given by the **average of the quantities between 2017 and 2018**. Calculate the CPI for 2017 and 2018, as well as the annual CPI inflation rate. Why is GDP deflator inflation rate lower?

CPI in 2017 = $\mathbf{100}$**;** **CPI in 2018** $= \mathbf{100} \times \frac{(\mathbf{6}\times\mathbf{\$40})+(\mathbf{5}\times\mathbf{\$40})+(\mathbf{10}\times\mathbf{\$20})+(\mathbf{4}\times\mathbf{\$110})}{(\mathbf{6}\times\mathbf{\$30})+(\mathbf{5}\times\mathbf{\$20})+(\mathbf{10}\times\mathbf{\$15})+(\mathbf{4}\times\mathbf{\$100})} = \mathbf{100} \times \frac{\mathbf{\$1080}}{\mathbf{\$830}} = \mathbf{130.12}$.

Annual CPI inflation rate = $\mathbf{30.12}\%$**.**

A possible explanation is that consumers switched away from Good B to the other goods. The GDP deflator is better suited to account for this substitution effect because the basket of goods is not fixed like the CPI. As a result, the CPI inflation rate is likely biased upwards.

#32. (30 pts) This question focuses on the labor market and unemployment using the most recent U.S. data. The adult population (*N*) of the U.S. is approximately 259 million. The labor force is approximately 162.5 million and the number of employed workers (*E*) is approximately 156.5 million.

(a) (15 pts) What is the unemployment rate? What is the labor force participation rate? Both are lower than 2010 U.S. values. Give a plausible reason why each labor market indicator is lower in 2018.

The number of unemployed workers is 6 million, which is the difference between the total labor force (162.5 million) and the number of employed workers (156.5 million). The unemployment rate is $u = \frac{6}{162.5} = 3.7\%$. The labor force participation rate is $\frac{162.5}{259} = 62.7\%$. The unemployment rate is lower than in 2010 because in 2010 the economy was just starting to come out of the Great Recession. The labor force participation rate is lower because the baby boomers are continuing to retire and drop out of the labor force.

(b) (15 pts) The rate of job finding (f) is 0.1. Calculate the rate of job separation (s) that is consistent with a 5% natural rate of unemployment? How many people are finding and losing their job each month? Using the given value of f and the calculated value of s, will the unemployment rate in part (a) go up or down next month? Explain.

The formula for the natural rate of unemployment is $u_n = \frac{s}{s+f} = \frac{s}{s+0.1} = 5\%$. Solving for s, the rate of job finding must be $s = 0.00526$. Each month $sE = 0.00526 * 156.5 = 0.8239$ million workers are separated from their jobs. Each month $fU = 0.1 * 6 = 0.6$ million unemployed people find a job. Since more people are being separated from their job than are finding a job, the unemployment rate should be rising. This is expected because 3.7% (current rate) is less than 5% (natural rate).

#33. (40 pts) Consider the following short-run, open-economy model of the economy.

Goods Market	Money Market
$C = 50 + 0.5(Y - T)$	$M = 20{,}000$
$I = 150 - 10r; NX = -200$	$P = 100$
$G = 150;\ T = 100$	$L(Y, r) = Y - 50r$

(a) (10 pts) Graph the IS and LM equations and the find the equilibrium values of r and Y. Show the equilibrium values on the graph and make sure to clearly label everything.

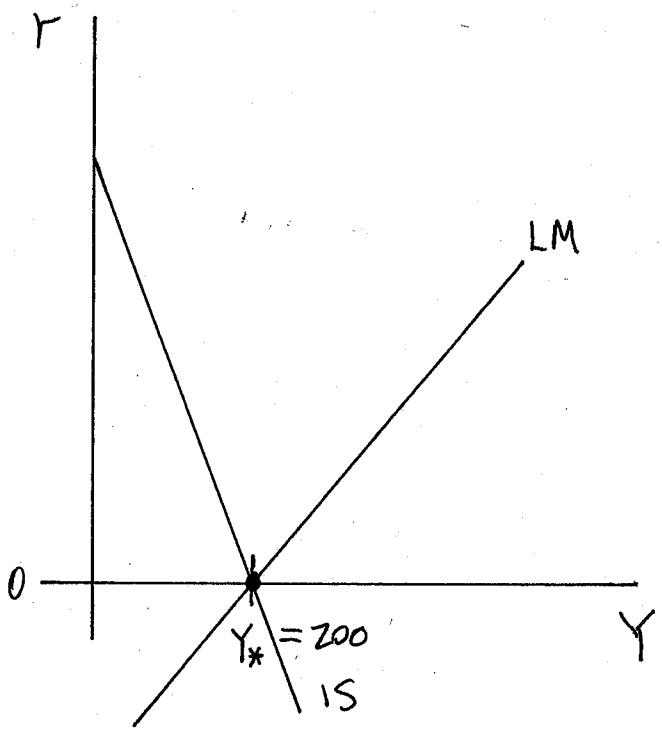
IS Equation

$$Y = C + I + G + NX$$
$$Y = 50 + 0.5(Y - 100) + 150 - 10r + 150 - 200$$
$$0.5Y = 100 - 10r$$
$$r = 10 - 0.05Y$$

LM Equation

$$M/P = L(Y, r)$$
$$200 = Y - 50r$$
$$r = -4 + 0.02Y$$

Setting IS equal to LM gives: $10 - 0.05Y = -4 + 0.02Y$. Solving for r gives $r_* = 0$ and $Y_* = 200$.



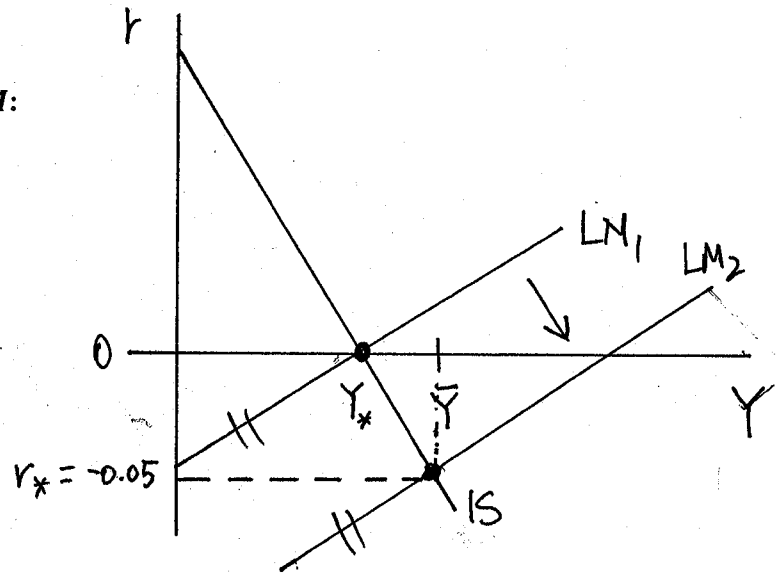
(b) (10 pts) Assume the natural rate of output is $\bar{Y} = 210$, individuals do not hold currency ($cr = 0$), and the reserve requirement is 10% ($rr = 0.1$). If the Fed desires to return the economy to its natural level, what should they do with reserves (R) and the money supply (M)? Show the effect in an IS-LM diagram.

The money multiplier is $1/rr = 10$. If the Fed wishes to return to $\bar{Y} = 210$, then we substitute $\bar{Y} = 210$ into the IS & LM curves and solve for M:

$$10 - 0.05(210) = -(M/5000) + 0.02(210)$$

The solution is $M = 23{,}500$. The money supply needs to increase by 3,500. Since the money multiplier is 10, reserves need to increase by 350.

The new equilibrium interest rate is $r_* = -0.05$.



(c) (10 pts) Ignore part (b). Policymakers plan to balance the budget by decreasing G. What is the size of the Keynesian-cross government spending multiplier and the horizontal shift in the IS curve? Show this on your graph in part (a). What are the resulting IS-LM equilibrium values of r and Y after the shift? What is the size of the effective IS-LM government spending multiplier? Why is it smaller?

The Keynesian-cross government spending multiplier is $\frac{1}{1-MPC} = \frac{1}{0.5} = 2$. If policymakers decreases government spending by 50, it will balance the budget and shift the IS curve to the left by 100. The new IS curve is $r = 5 - 0.05Y$. The new equilibrium values are $r_* = -1.43$ and $Y_* = 128.6$. The effective IS-LM government spending multiplier is therefore $\frac{\Delta Y}{\Delta G} = \frac{128.6}{100} = 1.286$. This is smaller than the Keynesian cross multiplier because the decrease in G causes a reduction in r, which in turn increases private investment (I). This is often referred to as "crowding in" of private investment.

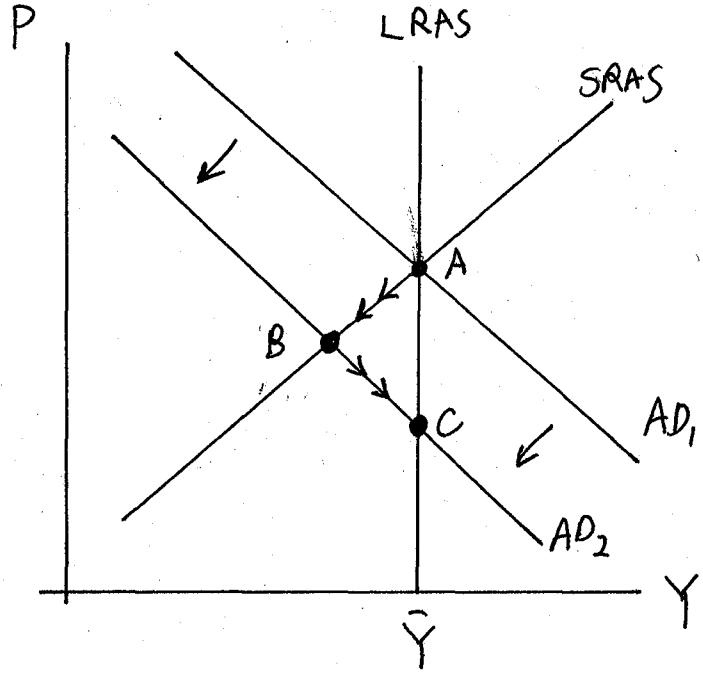
(d) (10 pts) If you did parts (b) and (c) correctly, then $r_* < 0$. Is this possible? If so, explain how.

Yes, this is possible. This is the ex ante real interest rate. Using the Fisher equation, the real interest rate is given by $r = i - \pi^e$. Therefore, if inflation expectations (π^e) are higher than the current nominal interest rate, the equilibrium real interest rate (r_*) will be negative.

#34. (30 pts) AD-SRAS-LRAS model of the economy. Assume the SRAS curve is upward sloping.

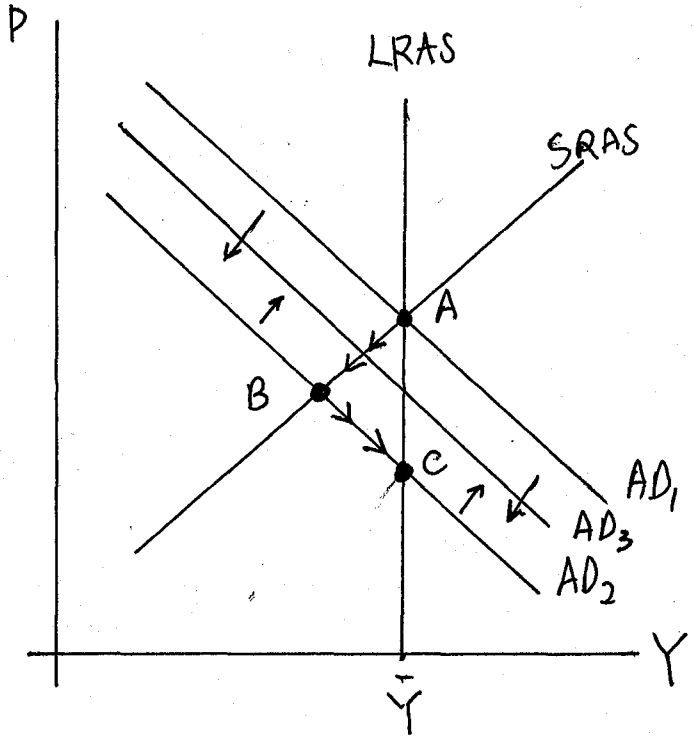
(a) (15 pts) Assume the Mueller investigation finds hard evidence of Russian collusion in our elections. The actions to follow create political and economic uncertainty, which in turn causes consumers to reduce their consumption. Use the AD-SRAS-LRAS diagram to discuss the predicted short- and long-run impacts on the price level, real GDP and unemployment. Clearly label your graph and write a concise paragraph to accompany your graph.

The reduction in consumption will shift the AD curve down and to the left. In the short run, the economy will experience a lower price level, lower real GDP, and higher unemployment. This is a movement from point A to point B on the graph. Over time, accumulated inventories and higher unemployment will force produces to lower prices, gradually shifting the SRAS down and to the right to a new long-run equilibrium at point C. Real GDP and unemployment will return to their natural levels, but the price level will be lower.



(b) (15 pts) Discuss the possible fiscal and monetary responses to the adverse consumption shock described in part (a). Use an AD-SRAS-LRAS diagram to support your discussion.

If the President and Congress are concerned about rising unemployment, they could increase government spending and/or lower taxes. If the Fed was concerned, they could increase the money supply. Either of these policies would shift the AD curve to the right so the unemployment rate would not increase as much. If G or M increased (or T decreased) enough, policymakers could completely offset the effect of the consumption reduction. The other option is for policymakers to do nothing and simply wait for the long run when firms will lower prices and wages, causing the economy to return to a long-run equilibrium.



#35. (10 pts) Draw a line to match the best answer (right column) to the question (left column).