ECON 3010 Intermediate Macroeconomics
Solutions to the Final Exam

Multiple Choice Questions. (60 points; 3 pts each)

#1. An economy's _____ equals its _____.

a. consumption; income
b. consumption; expenditure on goods and services
c. expenditure on goods; expenditure on services
d. income; expenditure on goods and services

#2. Chain-weighted measures of real GDP make use of prices from:

a. an unchanging base year.
b. a continuously changing base year.
c. a base year that is changed approximately every 5 years.
d. a base year that is changed approximately every 10 years.

#3. If the number of employed increases while the number of unemployed does not change, the unemployment rate:

a. will increase.
b. will decrease.
c. will not change.
d. may either increase or decrease.

#4. 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 capital are added.
d. value of additional output when one dollar's worth of additional labor is added.

#5. The real interest rate is the:

a. rate of interest actually paid by consumers.
b. rate of interest actually paid by banks.
c. rate of inflation minus the nominal interest rate.
d. nominal interest rate minus the rate of inflation.

#6. To increase the money supply, the Federal Reserve:

a. buys government bonds.
b. sells government bonds.
c. buys corporate stocks.
d. sells corporate stocks.

#7. Bank reserves equal:

a. gold kept in bank vaults.
b. gold kept at the central bank.
c. currency plus demand deposits.
d. deposits that banks have received but have not lent out.

#8. The demand for real money balances is generally assumed to:

a. be exogenous.
b. be constant.
c. increase as real income increases.
d. decrease as real income increases.

#9. The opportunity cost of holding money is the:

a. nominal interest rate.
b. unemployment rate.
c. federal funds rate.
d. prevailing mortgage rate.

#10. The value of net exports is also the value of:

a. net investment.
b. net saving.
c. national saving.
d. the excess of national saving over domestic investment.

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

a. productivity
b. turnover
c. unionization
d. shirking

#12. Discouraged workers are counted as:

a. part of the labor force.
b. out of the labor force.
c. employed.
d. unemployed.

#13. Stabilization policy refers to policy actions aimed at:

a. reducing the severity of short-run economic fluctuations.
b. equalizing incomes of households in the economy.
c. maintaining constant shares of output going to labor and capital.
d. preventing increases in the poverty rate.

#14. An economic change that does not shift the aggregate demand curve is a change in:

a. the money supply.
b. the investment function.
c. the price level.
d. taxes.

#15. An increase in the interest rate:

a. reduces investment, because the interest rate is the cost of borrowing to finance investment projects.
b. increases investment, because the people who make money from interest have more money to invest.
c. has no effect on investment.
d. may be caused by a drop in consumption.

#16. 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.

#17. The total debt-to-GDP ratio in the U.S. is:

a. between 10% and 20%.
b. around 50%.
c. approximately 100%.
d. between 200 and 250%.

#18. 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.

#19. If government debt is not changing, then:

a. the economy is at long-run equilibrium.
b. the government's budget must be balanced.
c. GDP must equal the natural rate of output.
d. capital per worker is constant.

#20. The Taylor rule for monetary policy relates the output gap and inflation to the:

a. velocity of money.
b. reserve requirement on deposits.
c. federal funds rate.
d. meeting schedule of the FOMC.

Problem Solving / Essay Questions. (120 points)

#21. (30 pts) Consider a macroeconomy that produces three goods.

Product	Quantity 2015	Quantity 2016	Price 2015	Price 2016
A	5	6	$20	$25
B	5	7	$10	$15
C	5	4	$5	$10

(a) (10 pts) Calculate nominal and real GDP for 2015 and 2016 using 2015 as the base year. What is the GDP deflator in 2015 and 2016? What is the corresponding inflation rate?

Nominal GDP in 2015 $= (5 \times \$20) + (5 \times \$10) + (5 \times \$5) = \$175$.

Nominal GDP in 2016 $= (6 \times \$25) + (7 \times \$15) + (4 \times \$10) = \$295$.

Real GDP in 2015 = Nominal GDP in 2015.

Real GDP in 2016 $= (6 \times \$20) + (7 \times \$10) + (4 \times \$5) = \$210$.

GDP Deflator in 2015 $= 100 \times$ (Nominal GDP in 2015 / Real GDP in 2015) $= 100$.

GDP Deflator in 2016 $= 100 \times$ (Nominal GDP in 2016 / Real GDP in 2016) $= 100 \times \left(\frac{295}{210}\right) = 140$.

Inflation rate $= 40\%$.

(b) (10 pts) Assume that the typical consumer's basket of goods is given by the quantities in 2015. Calculate the CPI for 2015 and 2016, as well as the CPI inflation rate.

CPI in 2015 $= 100$.

CPI in 2016 $= 100 \times \frac{(5 \times \$25) + (5 \times \$15) + (5 \times \$10)}{(5 \times \$20) + (5 \times \$10) + (5 \times \$5)} = 100 \times \frac{\$250}{\$175} = 143$.

CPI inflation rate $= 43\%$.

(c) (10 pts) Did aggregate output increase or decrease between 2015 and 2016? How does this relate to the change in real GDP? Why do you think the quantity of good C fell? Defend your answer.

The production of Goods A and B went up while the production of Good C went down. These are different goods, so it is hard to aggregate them without using prices. That's what real GDP does, using the prices from a base year. In this case, real GDP rose because the increasing goods (Goods A and B) have a higher market value than the decreasing good (Good C). The quantity of good C likely fell because of substitution away from C due to the relatively greater price increase.

#22. (30 pts) This question focuses on the labor market and unemployment. Assume the adult population (N) of the U.S. is 255 million. The number of employed workers (E) is 145 million, and the number of unemployed workers (U) is 8 million.

(a) (10 pts) What is the unemployment rate and the labor force participation rate?

The unemployment rate is $u = \dfrac{8}{8+145} = 5.23\%$.

The labor force participation rate is $\dfrac{153}{255} = 60\%$.

(b) (10 pts) The job finding rate (f) is 0.19 and the rate of job separation (s) is 0.01. What is the natural rate of unemployment? Is the current unemployment rate higher or lower than the natural rate? Use f and s to show that next month the actual unemployment rate will be closer to the natural rate.

The natural rate of unemployment is $u_n = \dfrac{0.01}{0.01+0.19} = 5\%$. The current unemployment rate of 5.23% is higher than the natural rate of 5%. The change in employment is $\Delta E = fU - sE = 0.19 * 8 - 0.01 * 145 = 1.52 - 1.45 = 0.07$. The change in unemployment is $\Delta U = sE - fU = 0.01 * 145 - 0.19 * 8 = 1.45 - 1.52 = -0.07$. The new employment level is 145.07 and the new unemployment level is 7.93. This implies that the new unemployment rate is…

$$u = \frac{7.93}{7.93+145.07} = 5.18\%,$$

which is closer to the natural rate of 5%.

(c) (10 pts) Congress is concerned that the natural unemployment rate is too high. Name two policy options to lower the rate and <u>explain why they would be effective</u>.

Congress has several options available. Some examples include: 1) reduce minimum wages, 2) disseminate information about job openings, 3) sponsor job re-training programs that help displaced workers transition back to the labor force, and 4) lessen the duration and generosity of unemployment benefits, to name a few.

#23. (30 pts) Consider the following short-run, open-economy model of the economy.

Goods Market	Money Market
$C = 100 + 0.9(Y - T)$	$M = 4000$
$I = 50 - 7.5r; NX = -50$	$P = 10$
$G = 200; T = 100$	$L(Y,r) = Y - 350r$

(a) (10 pts) Graph the IS and LM equations and the find the equilibrium values of r and Y.

IS Equation

$Y = C + I + G + NX$
$Y = 100 + 0.9(Y - 100) + 50 - 7.5r + 200 - 50$
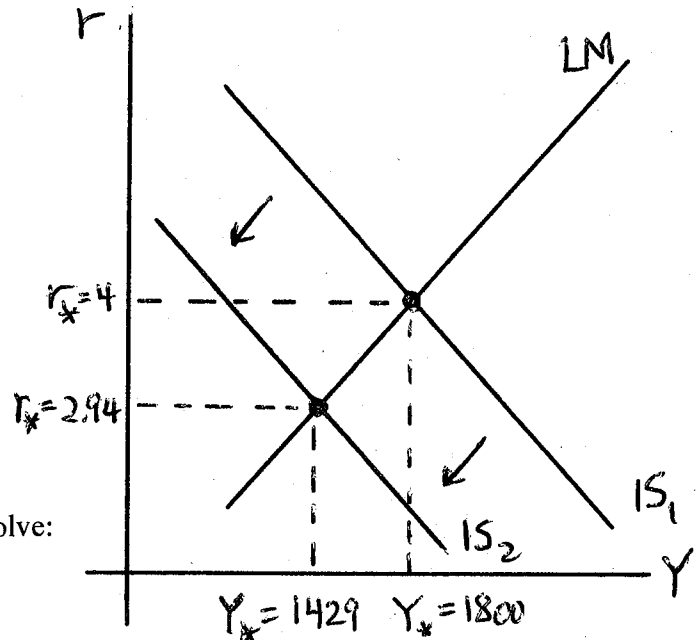$Y = 2100 - 75r$

LM Equation

$M/P = L(Y,r)$
$400 = Y - 350r$
$Y = 400 + 350r$

Equilibrium Values

Set the IS and LM equations equal to one another and solve:

$2100 - 75r = 400 + 350r \Rightarrow r_* = 4\%, Y_* = 1800.$

(b) (10 pts) What is the value of the Keynesian-cross tax multiplier? Policymakers wish to shift the IS curve to the left by 450. How much do they need to raise taxes to do so? What are the resulting equilibrium values of r and Y?

The Keynesian-cross tax multiplier is $\frac{-MPC}{1-MPC} = \frac{-0.9}{0.1} = -9$. If policymakers raise taxes by 50, it will shift the IS curve to the left by 450. The new equilibrium values are $r_* = 2.94$ and $Y_* = 1429$.

(c) (10 pts) At equilibrium in part (a), what is the value of national saving? Investment? Net capital outflows? Assume a shock occurs that makes exports more appealing. At current interest rates, does the dollar need to depreciate or appreciate to bring the foreign exchange market back into equilibrium (i.e., NX = S – I)? Defend your answer.

National savings is $S = Y - C - G = 1800 - 1630 - 200 = -30$. Investment is $I = 50 - 7.5 * 4 = 20$. Net capital outflows are $S - I = NX = -50$. Since net capital outflows is fixed, the dollar would need to appreciate to reduce net exports and bring the foreign exchange market back to equilibrium.

#24. (30 pts) AD-SRAS-LRAS model of the economy. Assume the SRAS curve is upward sloping.

(a) (15 pts) Congress has debated raising the minimum wage to over $10 per hour. Doing so would permanently increase the production costs to businesses, especially those relying on lower-skilled workers. Use the AD-AS model to discuss the macro impacts on the price level, real GDP and unemployment.

Raising the minimum wage will increase costs to producers. This will shift the SRAS up. In the short run, the economy will experience a higher price level (i.e., inflation), 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 back to its original equilibrium at point A.
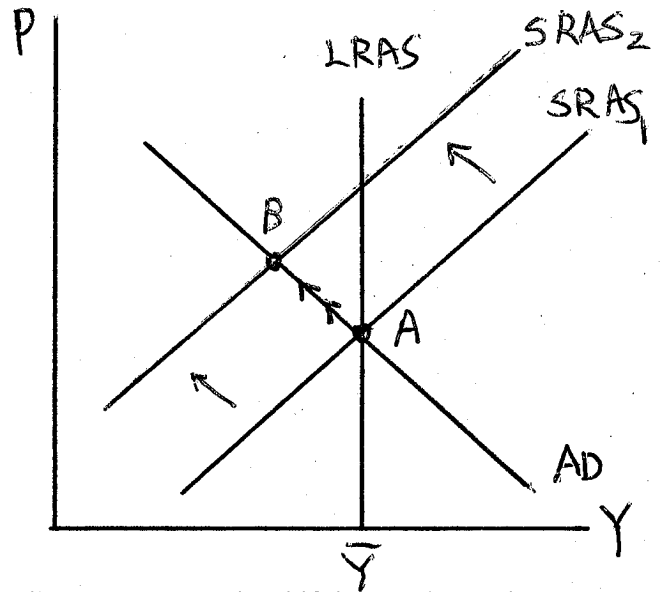
(b) (15 pts) The Federal Reserve has decided to design a policy response to the shift in part (a). What policy options are available and what are the associated trade-offs? Use an AD-AS diagram to support your discussion.

If the Fed is concerned about inflation, they could start to contract the money supply and raise interest rates. This would shift the AD curve to the left so the price level would not rise as far. However, this would depress real GDP even more, as well as generating additional unemployment. The other option is for the Fed to increase the money supply and shift the AD to the right. They could keep output at its natural level, but it would lead to even more inflation.
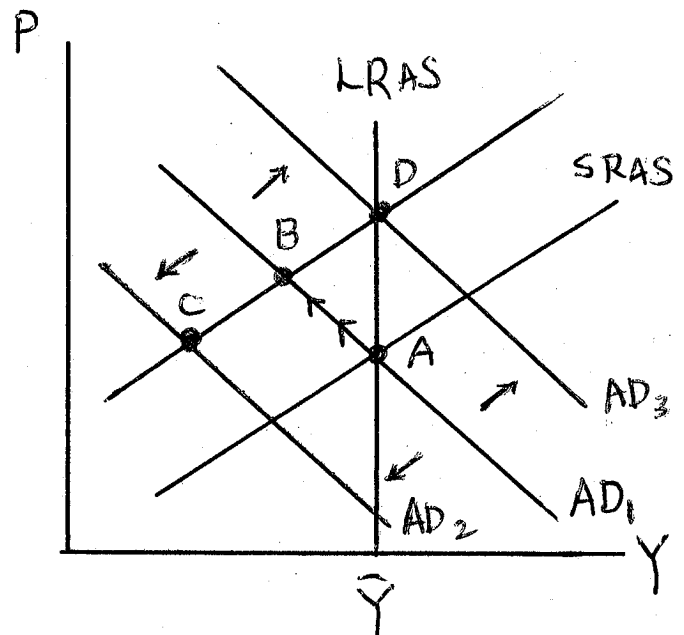
#25. (20 pts) True or False. If "False", correct the statement to make it true.

(a) (5 pts) "Real GDP growth is currently less than nominal GDP growth in the U.S."

True.

(b) (5 pts) "The Phillips curve captures the relationship between inflation and unemployment, all else held constant."

True.

(c) (5 pts) "President-elect Trump has proposed $1 billion in new infrastructure spending."

False. Trump has proposed $1 *trillion* in new infrastructure spending.

(d) (5 pts) "Nearly all of the U.S. federal debt is held by the Federal Reserve system."

False. The Federal Reserve System holds about 20% of the U.S. federal debt.