

ECON 3010 Intermediate Macroeconomics – Solutions to Exam #1**Multiple Choice Questions. (25 points; 2.5 pts each)**

#1. The marginal propensity to consume is the:

- a. ratio of consumption to income.
- b. amount consumed out of an additional dollar of income.
- c. amount available for consumption after precautionary saving.
- d. ratio of consumption to wealth.

#2. Discouraged workers are counted as:

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

#3. If the number of employed workers equals 200 million and the number of unemployed workers equals 20 million, the unemployment rate equals _____ percent (rounded to the nearest percent).

- a. 0
- b. 9
- c. 10
- d. 20

#4. Unlike the GDP deflator, the CPI includes the prices of:

- a. goods purchased by firms.
- b. goods purchased by governments.
- c. exported goods.
- d. imported goods.

#5. If the adult population equals 250 million, of which 145 million are employed and 5 million are unemployed, the labor force participation rate equals _____ percent.

- a. 50
- b. 58
- c. 60
- d. 67

#6. If the unemployment rate is 6 percent and the number of employed is 188 million, then the labor force equals _____ million.

- a. 11.28
- b. 176.72
- c. 188
- d. 200

#7. Which of the following is a flow variable?

- a. wealth
- b. the number unemployed
- c. government debt
- d. income

#8. A competitive, profit-maximizing firm hires labor until the:

- a. marginal product of labor equals the nominal wage.
- b. price of output multiplied by the marginal product of labor equals the nominal wage.
- c. real wage equals the real rental price of capital.
- d. wage equals the rental price of capital.

#9. Assume that the investment function is given by $I = 1,000 - 30r$, where r is the real rate of interest (in percent). Assume further that the nominal rate of interest is 10 percent and the inflation rate is 2 percent. According to the investment function, investment will be:

- a. 240.
- b. 700.
- c. 760.
- d. 970.

#10. An example of increasing returns to scale is when capital and labor inputs:

- a. both increase 10 percent and output increases 5 percent.
- b. both increase 10 percent and output increases 10 percent.
- c. both increase 5 percent and output increases 10 percent.
- d. do not change and output decreases 5 percent.

Problem Solving / Essay Questions. (75 points)

#11. (30 pts) Consider a macroeconomy that only produces guns and butter. Use the information below to answer the following questions.

Product	Quantity		Price (in dollars)	
	2016	2017	2016	2017
Guns	20	25	\$100	\$90
Butter	150	140	\$10	\$15

(a) (10 pts) Calculate nominal and real GDP for 2016 and 2017 using 2016 as the base year. What is the annual growth rate in the nominal and real GDP over this period? If nominal GDP grows at this same rate, what will it be in 2018?

SOLUTION:

- **2016 Nominal GDP** = $(20 \times \$100) + (150 \times \$10) = \$3500$
- **2017 Nominal GDP** = $(25 \times \$90) + (140 \times \$15) = \$4350$
- **2016 Real GDP** = $\$3500$
- **2017 Real GDP** = $(25 \times \$100) + (140 \times \$10) = \$3900$
- **Growth Rate in Nominal GDP (2016-2017)** = $\frac{\$4350 - \$3500}{\$3500} \times 100 = 24.29\%$
- **Growth Rate in Real GDP (2016-2017)** = $\frac{\$3900 - \$3500}{\$3500} \times 100 = 11.43\%$
- **Predicted Nominal GDP in 2018** = $\$4350 \times (1 + 0.2429) = \5407

(b) (10 pts) Assuming that the 2016 quantities in the table represent the typical consumer's basket of goods, calculate the CPI and GDP deflator for 2016 and 2017.

SOLUTION:

- **2016 GDP Deflator** = 100
- **2017 GDP Deflator** = $\frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100 = \frac{\$4350}{\$3900} \times 100 = 111.54$
- **2016 CPI** = 100
- **2017 CPI** = $\frac{\text{Cost of Basket in 2017 dollars}}{\text{Cost of Basket in 2016 dollars}} \times 100 = \frac{\$4050}{\$3500} \times 100 = 115.71$

- (c) (10 pts) What are the inflation rates between 2016 and 2017 for the two price measures above? Choose a good or service that is in the GDP deflator, but not in the CPI. Similarly, choose a good or service that is in the CPI, but not the GDP deflator. Explain your rationale in both cases.

SOLUTION:

- **The rates of inflation are....**

- $\pi_{GDP\ deflator} = \frac{111.54-100}{100} \times 100 = 11.54\%$ and

- $\pi_{CPI} = \frac{115.71-100}{100} \times 100 = 15.71\%$

- **Toyota vehicles are in the CPI, but not in the GDP deflator because many of them are manufactured outside the U.S. and imported. Armored tanks are in the GDP deflator because they are part of government spending, but they are not in the typical consumer's basket of goods.**

#12. (30 pts) Consider the following Neoclassical model of a *closed* economy, where r is in percentage terms. Show all your work.

Supply	Demand
$Y = F(K, L) = 5K^{1/2}L^{1/2}$	$C = 40 + 0.5(Y - T)$
$K = 25; L = 36$	$I = 30 - 5r$
	$G = 25, T = 20$

(a) (5 pts) What is the level of GDP in the economy? How much of national income goes to workers and how much goes to the owners of capital? Show your work.

SOLUTION:

- The level of GDP is $Y = 5 \cdot 25^{1/2} 36^{1/2} = 5 \times 5 \times 6 = 150$.
- The amount going to workers is ... $L \times \left(\frac{W}{P}\right) = L \times MPL = L \times \left(\frac{5}{2}\right) K^{1/2} L^{-1/2} = \left(\frac{5}{2}\right) K^{1/2} L^{1/2} = \left(\frac{1}{2}\right) Y = 150/2$.
- The amount going to the owners of capital is ... $K \times \left(\frac{R}{P}\right) = K \times MPK = K \times \left(\frac{5}{2}\right) K^{-1/2} L^{1/2} = \left(\frac{5}{2}\right) K^{1/2} L^{1/2} = \left(\frac{1}{2}\right) Y = 150/2$.

(b) (10 pts) Find the interest rate that produces equilibrium in the goods and services market. Then use a demand-supply diagram to show how the equilibrium interest rate is predicted to change if President Trump builds “the wall” between Mexico and the U.S. What will “the wall” do to private investment spending? Explain.

SOLUTION:

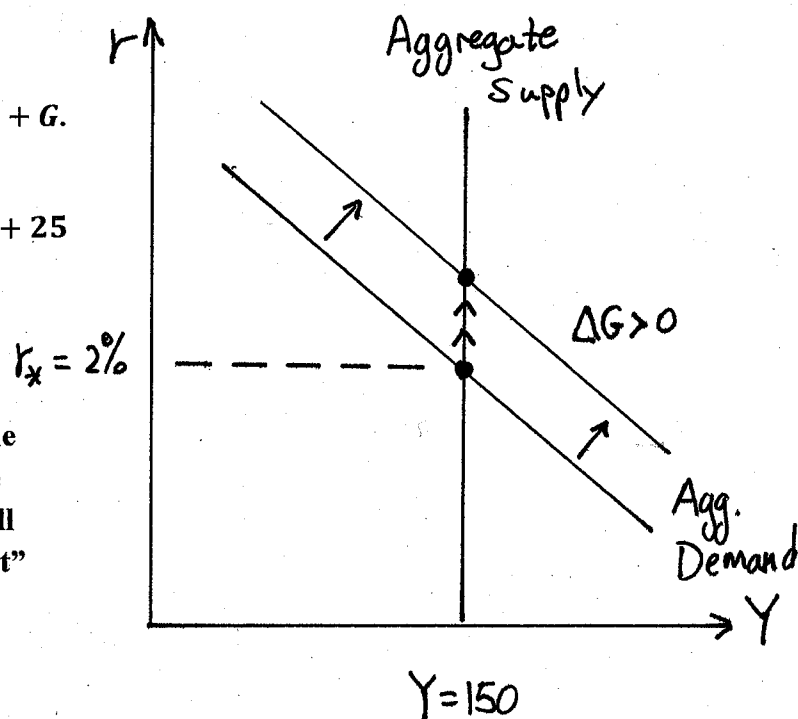
- The equilibrium condition is: $Y = C + I + G$.
Substitution gives...

$$150 = 40 + 0.5(130) + 30 - 5r + 25$$

$$150 = 160 - 5r$$

$$r_* = 2\%$$

- “The wall” reflects an increase in G . The increase in G will increase the aggregate demand for goods and services. This will increase the interest rate and “crowd out” private investment.



(c) (10 pts) Show that the interest rate from part (b) also clears the market for loanable funds. Show this equilibrium in a diagram.

- The equilibrium condition is: $S = I$.

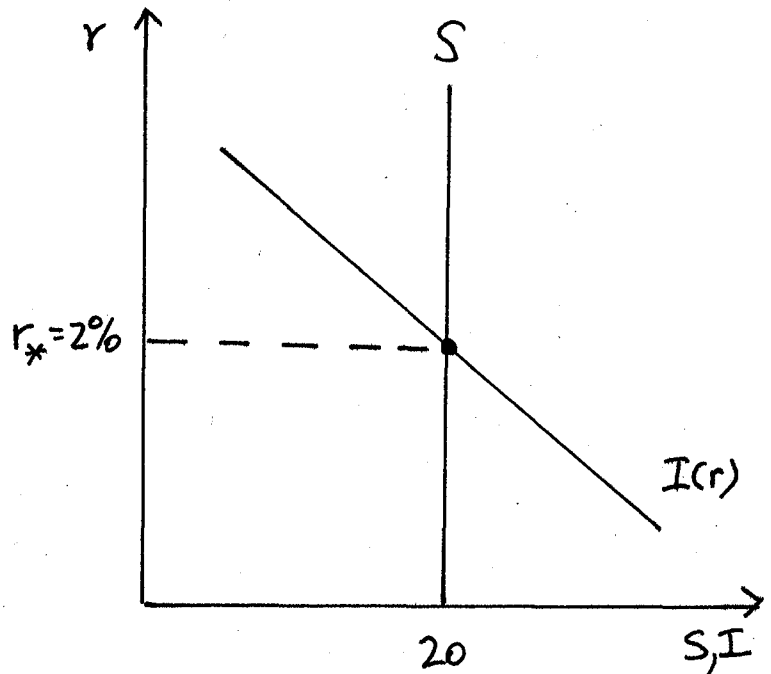
$$S_{pr} + S_{pu} = I$$

$$Y - C - G = I$$

$$150 - 105 - 25 = 30 - 5r$$

$$r_* = 2\%$$

- The equilibrium interest rate clears the loanable funds market and the goods market.



(d) (5 pts) Now assume that Congress passes a *budget-neutral* tax increase to pay for “the wall”, one that leaves the budget unchanged. Show the impact of the change in G and T in your loanable funds diagram. [HINT: To check your intuition, it might be helpful to substitute new numbers for G and T and re-calculate the equilibrium interest rate.]

- To keep the budget unchanged, the increase in G due to “the wall” will need to be matched by an equal increase in T . Let the increase in G be equal to 10. Therefore the increase in T must also be equal to 10.

The new equilibrium condition is....

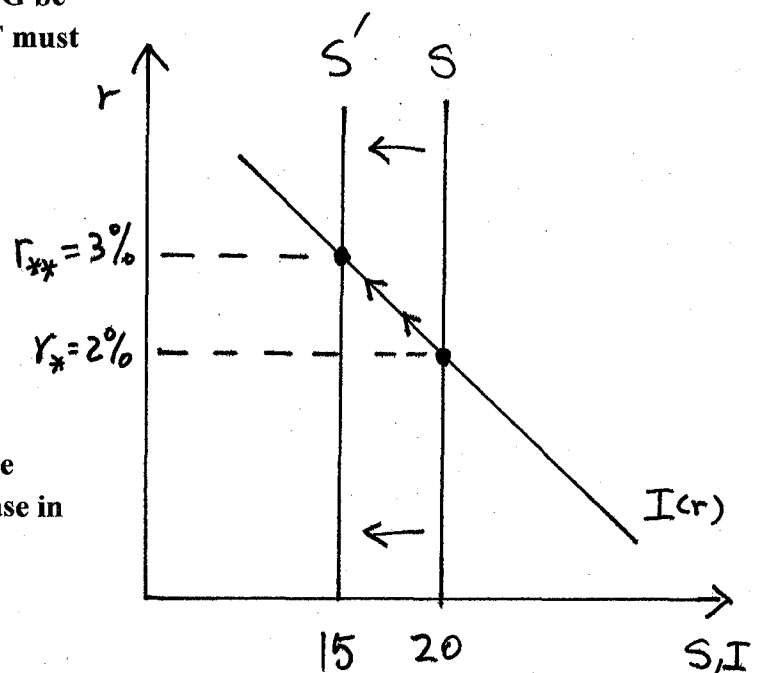
$$S_{pr} + S_{pu} = I$$

$$Y - C - G = I$$

$$150 - 100 - 35 = 30 - 5r$$

$$r_* = 3\%$$

- The budget-neutral spending will reduce national savings (S) and cause an increase in equilibrium interest rates (r).



#13. (15 pts) True or False. If false, correct the statement to make it true.

(a) (5 pts) The labor force participation rate has declined over the past decade primarily because women are dropping out of the labor force.

FALSE. The labor force participation rate has declined over the past decade primarily because the “baby boomers” are retiring.

(b) (5 pts) If you live in your own house, it does not count in GDP. If you rent your house, it counts in GDP.

FALSE. It doesn't matter whether you live in your house or rent it; both count in GDP. When you live in your own house, the imputed value of your housing services are included in GDP.

(c) (5 pts) Social security is part of GDP.

FALSE. Social security is considered a transfer payment and not included in GDP.