

# Intermediate Macroeconomics 311

## 1<sup>st</sup> Midterm, January 30<sup>th</sup>, 2023

**Note:** This is a closed book exam. You may use calculators.

**SECTION:** \_\_\_\_\_

**YOUR NAME:** \_\_\_\_\_

**Directions:** Answer each of the following questions. Show all your work. No partial credit will be given. Good Luck!

**NetID:** \_\_\_\_\_

### Multiple Choice Questions' Answer Grid

1		6		11		16		21		26	
2		7		12		17		22		27	
3		8		13		18		23		28	
4		9		14		19		24		29	
5		10		15		20		25		30	

**PART A: Multiple choice. Choose the one alternative that best completes the statement or answers the question. Fill your answer in page 1's answer grid. (30 points: 1 point each)**

- 1) Between 1995 and the present, the growth rate of nominal GDP has been
  - a) higher than the growth rate of M2
  - b) lower than the growth rate of M2
  - c) lower than the inflation rate
  - d) the same as the growth rate of M2
  - e) the same as the inflation rate
  
- 2) If the demand for money depends on the nominal interest rate, then via the quantity theory and the Fisher equation, the price level depends on:
  - a) only the current money supply.
  - b) only the expected future money supply.
  - c) both the current and expected future money supply.
  - d) neither the current nor the expected future money supply.
  
- 3) Open-market operations are:
  - a) Commerce Department efforts to open foreign markets to international trade.
  - b) Federal Reserve purchases and sales of government bonds.
  - c) Securities and Exchange Commission rules requiring open disclosure of market trades.
  - d) Treasury Department purchases and sales of the U.S. gold stock.
  
- 4) The quantitative easing operations conducted by the Federal Reserve between 2008 and 2014 resulted in \_\_\_\_\_ increases in the monetary base and \_\_\_\_\_ increases in money supply.
  - a) no; no
  - b) large; larger
  - c) large; smaller
  - d) small; smaller
  
- 5) In a classical model with fixed factors of production and flexible prices, the amount of consumption spending depends on \_\_\_\_\_, the amount of investment spending depends on \_\_\_\_\_, and the amount of government spending is determined \_\_\_\_\_.
  - a) the interest rate; disposable income; by tax revenue
  - b) the real wage; the real rental price of capital; by factor prices
  - c) labor's share of output; capital's share of output; by the interest rate
  - d) disposable income; the interest rate; exogenously

- 6) If the inflation rate is 10 percent per year, how many years does it take for the currency to lose 90 percent of its value?
- a) 10 years
  - b) 15 years
  - c) 23 years
  - d) 30 years
- 7) The expected real interest rate will be greater than the actual real interest rate when the:
- a) rate of inflation is increasing.
  - b) rate of inflation is decreasing.
  - c) actual rate of inflation is greater than the expected rate of inflation.
  - d) actual rate of inflation is less than the expected rate of inflation.
- 8) The core inflation rate:
- a) measures the change in producer prices.
  - b) is measured using a Paasche index.
  - c) excludes food and energy prices.
  - d) includes the price of exports and excludes the price of imports
- 9) Assume that an increase in consumer confidence raises consumers' expectations of future income and thus the amount they want to consume today for any given level of disposable income. This shift, in a neoclassical economy, will:
- a) lower investment and raise the interest rate.
  - b) raise investment and lower the interest rate.
  - c) lower both investment and the interest rate.
  - d) raise both investment and the interest rate.
- 10) Gross national product (GNP) equals gross domestic product (GDP) \_\_\_\_\_ income earned domestically by foreigners \_\_\_\_\_ income that nationals earn abroad.
- a) plus; plus
  - b) minus; minus
  - c) minus; plus
  - d) plus; minus
- 11) If government purchases exceed taxes minus transfer payments, then the government budget is:
- a) balanced.
  - b) in deficit.
  - c) in surplus.
  - d) endogenous.

12) Currency equals:

- a) M1.
- b) the sum of funds in checking accounts.
- c) the sum of checking accounts and paper money.
- d) the sum of coins and paper money.

13) In a fractional-reserve banking system, banks create money because:

- a) each dollar of reserves generates many dollars of demand deposits.
- b) banks have the legal authority to issue new currency.
- c) funds are transferred from households wishing to save to firms wishing to borrow.
- d) the wealth of the economy expands when borrowers undertake new debt obligations.

14) Since 1980 the Federal deficit has primarily been \_\_\_\_\_ and the current account has primarily been \_\_\_\_\_ .

- a) positive; positive
- b) positive; negative
- c) negative; positive
- d) negative; negative

15) Net national product equals gross national product (GNP):

- a) plus net investment.
- b) minus net investment.
- c) plus depreciation.
- d) minus depreciation.

16) If nominal wages cannot be cut, then the only way to reduce real wages is by:

- a) inflation.
- b) unions.
- c) legislation.
- d) productivity increases.

17) During the period between 1900 and 2000, the unemployment rate in the United States was highest in the:

- a) 1920s.
- b) 1930s.
- c) 1970s.
- d) 1980s.

18) At the highest level of inflation in Venezuela, the bolivar lost 90% of its value in:

- a) 3 days
- b) 30 days
- c) 3 months
- d) 30 months

19) In the national income accounts, government purchases are goods and services purchased by:

- a) the federal government.
- b) the federal and state governments.
- c) the state and local governments.
- d) the federal, state, and local governments.

20) The investment function slopes \_\_\_\_\_ because there are \_\_\_\_\_ investment projects that are profitable as the interest rate decreases.

- a) upward; fewer
- b) upward; more
- c) downward; fewer
- d) downward; more

21) A fixed-weight price index like the consumer price index (CPI) \_\_\_\_\_ the change in the cost of living because it \_\_\_\_\_ take into account that people can substitute less expensive goods for ones that have become more expensive.

- a) underestimates; does not
- b) overestimates; does
- c) accurately estimates; does
- d) overestimates; does not

22) According to the definition used by the U.S. Bureau of Labor Statistics, people are considered to be unemployed if they:

- a) working part-time.
- b) are out of a job but not looking for work.
- c) retired from the labor force before age 65.
- d) do not have a job but have looked for work in the past four weeks.

23) The government purchases component of GDP does not include:

- a) federal spending on goods.
- b) state and local spending on goods.
- c) federal spending on transfer payments.
- d) federal spending on services.

24) Which of the following did NOT occur during the Great Depression between 1929 and 1933?

- a) increase in the currency-deposit ratio
- b) increase in the reserve-deposit ratio
- c) increase in the money supply
- d) increase in the monetary base

25) If the Fed announces that it will raise the money supply in the future but does not change the money supply today,

- a) both the nominal interest rate and the current price level will decrease.
- b) the nominal interest rate will increase and the current price level will decrease.
- c) the nominal interest rate will decrease and the current price level will increase.
- d) both the nominal interest rate and the current price level will increase.

26) According to the neoclassical theory of distribution, if firms are competitive and subject to constant returns to scale, total income in the economy is distributed:

- a) only to the labor used in production.
- b) partly between labor and capital used in production, with the surplus going to the owners of the firm as profits.
- c) equally between the labor and capital used in production.
- d) between the labor and capital used in production, according to their marginal productivities.

27) Credit card balances are included in:

- a) M1 only.
- b) M2 only.
- c) both M1 and M2.
- d) neither M1 nor M2.

28) The largest item on the liabilities side of the Federal Reserve's balance sheet is

- a) currency
- b) reserves
- c) Treasury securities
- d) mortgage-backed securities

29) On average between 1980 and now the 10-year Treasury bond rate has on average been \_\_\_\_\_ and on average has been \_\_\_\_\_ than the Federal Funds rate.

- a) rising; higher
- b) falling; higher
- c) rising; lower
- d) falling; lower

30) With a Cobb–Douglas production function, the share of output going to labor:

- a) decreases as the amount of labor increases.
- b) increases as the amount of labor increases.
- c) increases as the amount of capital increases.
- d) does not depend on the amount of labor in the economy.

## MCQ Solutions

Question	Answer
1	b
2	c
3	b
4	c
5	d
6	c
7	c
8	c
9	a
10	c
11	b
12	d
13	a
14	d
15	d
16	a
17	b
18	c
19	d
20	d
21	d
22	d
23	c
24	c
25	d
26	d
27	d
28	b
29	b
30	d



**PART B: Open Questions. Answer in the space given below the question. Always indicate the units used and round your answer to two decimal places. Show all your calculations (no justification, no points). (30 Points)**

1) Based on the data below, answer the subsequent questions. (10 points)

	USA	India
Total GDP 2021 (Trillion USD)	23	9.6
Population 2021 (Billions)	0.3	1.3
Projected GDP Growth Rates (2021 – 2100)	2%	8.7%

a) What was India's GDP per capita in USD in 2021? (2 points)

**Solution:**  $9.6 \cdot 1000 / 1.3 = 7384.62$  USD

b) For the US to have the same GDP per capita as India what would its population (in billions) have to be? Use your answer to a). (2 points)

**Solution:**  $23 \cdot 1000 / 7384.62 = 3.11$  billion people

c) If India's population grows at 2% a year, what should Indian's real GDP growth be for the country to double its GDP per capita in 10 years? (2 points)

**Solution:**  $X \cdot \exp((x-2)/100 \cdot 10) = X \cdot 2 \Leftrightarrow x = \ln(2) \cdot 10 + 2 = 8.93\%$

d) And when will India reach the US's GDP per capita if the US's population is expected to grow at 1% and India's at 2%? Round your answer up to a whole year (eg: 2000.1 => 2001). Hint: you are given the expected growth rates of India and U.S. real GDP in the third line of the data box above. (2 points)

**Solution:**  $(\ln(23 \cdot 1000 / 0.3) - \ln(9.6 \cdot 1000 / 1.3)) / (0.087 - 0.02 - 0.02 + 0.01) = 41.05$  round to 42 => 2021+42 = 2063.

e) Consider the following data on the GDP deflator for India:

GDP Deflator, India	Base year = 2020	Base year = 2021
2020	100	90
2021	115	100

Compute the chained growth rate of the GDP deflator. (2 points)

**Solution:**  $g_{b=2020} = 100 \times \ln\left(\frac{115}{100}\right) = 13.98\%$ , and  $g_{b=2021} = 100 \times \ln\left(\frac{100}{90}\right) = 10.54\%$ . So the chained growth is  $g = \frac{g_{b=2020} + g_{b=2021}}{2} = 12.26\%$ .

2) For closed economy A, yearly real consumption ( $C$ ) is given by the equation  $C = 500 + 0.5(Y - T)$ . Yearly real investment ( $I$ ) is given by the equation  $I = 2,000 - 100r$ , where  $r$  is the expected real interest rate, in percent. Government spending ( $G$ ) is 1,000, and taxes ( $T$ ) are also 1,000. (8 points)

a) If the expected real interest rate is 5%, what is the real GDP in this economy? (2 points)

**Solution:**  $Y = I + G + C = (2,000 - 100 \cdot 5) + 500 + 0.5(Y - 1000) + 1000 = 2500 + 0.5Y \Leftrightarrow Y = 5000$ .

b) If government spending increases from 1000 to 1500 but GDP remains the same what is the expected real interest? What do you call this phenomenon (the decrease in investment)? (2 points)

**Solution:**  $5000 = (2,000 - 100 \cdot r) + 500 + 0.5(5000 - 1000) + 1500 \Rightarrow r = 10$ . Crowding out effect of government spending.

c) Now suppose that the nominal interest rate is determined by the Fisher equation and that the central bank announces inflation will be 15% this year. Assume further that the nominal interest rate in the economy is fixed at 30%. What will be real GDP as a result of this announcement? Government spending and taxes are the same as in question a). (2 points)

**Solution:**  $r = i - E(\pi) = 30 - 15 = 15 \Rightarrow Y = (2000 - 100 \cdot 15) + 500 + 0.5(Y - 1000) + 1000 = 1500 - Y/2 \Rightarrow Y = 3000$

d) If real output is USD 3000 billion and aggregate production follows a Cobb-Douglas production function, factor markets are competitive, the share of real labour income is 30%, and capital is fixed at 10000 units priced at USD 1 billion each, what is the real rental rate of capital in percentage? Remember, the real rate of capital is the real interest rate paid on each unit of capital. (2 points)

**Solution:**  $\frac{r}{100} \cdot K = 1 - 0.3 \Leftrightarrow r = 100 \cdot \frac{3000}{10000} \cdot 0.7 = 21\%$

3) The money demand follows the following function:  $\frac{M^D}{P} = 2 \cdot Y\sqrt{i}$  where  $M$  denotes the money in circulation in Billion USD – D and S superscripts indicate its nominal demand and supply,  $Y$  denotes real output in Billion USD,  $P$  is the price level index, and  $i$  denotes the interest rate in percentage. Assume the Fisher equation is valid throughout. (12 points)

a) Find an algebraic expression for the velocity of money in this economy. (3 points)

**Solution:**  $PY = vM \Rightarrow v = \left(\frac{M}{P}\right)^{-1} Y = 1/(2\sqrt{i})$

b) Use your expression to compute the money velocity for an interest rate of 4%. If  $M$ ,  $P$  and  $Y$  are fixed, and are expected to remain as such, what is the real interest rate? (2 points)

**Solution:**  $\frac{1}{2\sqrt{4}} = \frac{1}{4}$ . If they are expected to remain fixed,  $E(\pi) = 0 \Rightarrow r = i = 4\%$  using the Fisher equation.

c) What is the price level if the money supply is USD 10 billion and output is USD 100 billion given the nominal interest in b? (2 points)

**Solution:**  $M^S = M^D \Rightarrow P = \frac{M^D}{2Y\sqrt{i}} = \frac{10}{2 \cdot 100 \sqrt{4}} = \frac{1}{40} = 0.025$

d) A new governor, known for being soft on inflation, is appointed to the central bank. As a result, the expected rate of inflation shots up to 5%. What is the new nominal interest rate and velocity of money? (2 points)

**Solution:**  $i = E(\pi) + r = 4\% + 5\% = 9\%$ . The velocity of money is now  $\frac{1}{2\sqrt{9}} = \frac{1}{6}$ .

e) Now, if output remains constant and the price level is growing at the expected rate of inflation, at which rate should the money supply grow to be consistent with expected inflation if expectations turn out to be correct? (3 points)

**Solution:** From the velocity of money equation, we know that  $M = \frac{PY}{v}$ . The numerator grows at 5% and the denominator is constant. As a result, the money supply must grow at the same rate, 5%.