

# ECON 311 - Intermediate Macroeconomics (Professor Gordon)

## Final Examination: Fall 2015

### Answer sheet

#### Part A. MC

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

Student ID: \_\_\_\_\_

Circle the TA session you attend:

Chris – 10AM      Michael - 3PM      Hugh - 3PM

Chris - 3PM      Michael - 4PM      Hugh - 4PM

#### INSTRUCTIONS:

1. The exam lasts **2 hour**.
2. The exam is worth 120 points in total (plus up to 4 time points): 30 points for the multiple choice questions (Part A), 60 points for the five analytical problems (Part B), and 30 points for the essay (Part C).
3. **Multiple choice:** choose the **one** alternative that best completes the statement or answers the question. **Write your answers for part A (the multiple choice section) in the blanks to the right.** You won't get credit for circled answers in the multiple choice section.
4. **Place all of your answers for part B in the space provided.**
5. You must show your work for part B questions. There is no need to explain your answers for the multiple choice questions.
6. **You must write your essays with a pen.** Write clearly!
7. **You must turn in both the answers and the multiple-choice questions. DO NOT PULL THEM APART.**

Good luck and Happy Holidays!

### PART A: Multiple Choice Problems

Answer multiple choice questions in the space provided to **the right**.  
**USE CAPITAL LETTERS.**

**Grading:** (do not fill out this part)

		MC (30)	Essay (30)	Time (4)	<b>Total</b>
Q1 (15)	Q2 (15)	Q3 (14)	Q4 (8)	Q5 (8)	

## PART B: Analytic Problems

### QUESTION 1: SP-DG Model (15 points):

Suppose that the following equations describe an economy currently at long-run equilibrium:

$$\begin{aligned}p_t &= p_t^e + 0.25 \cdot \hat{Y}_t + z_t \\p_t^e &= 0.25 \cdot p_{t-1}^e + 0.75 \cdot p_{t-1} \\ \hat{Y}_0 = 0, \hat{x}_0 = 2, p_0^e = 2, p_0 = 2, z_0 = 0.\end{aligned}$$

(A) Write down the SP and DG equations using the information above. (2 points)

SP	For the SP just plug the equation for $p_t^e$ into the first equation: $p_t = 0.25 \cdot p_{t-1}^e + 0.75 \cdot p_{t-1} + 0.25 \cdot \hat{Y}_t + z_t$
DG	The DG equation is always the same: $\hat{Y}_t = \hat{Y}_{t-1} + \hat{x}_t - p_t$

(B) Substitute the DG equation into the numerical SP equation and solve for  $p_t$  as a function of  $p_{t-1}, p_{t-1}^e, \hat{Y}_{t-1}, \hat{x}_t$ , and  $z_t$ . (2 points)

Follow the instructions:

$$\begin{aligned}p_t &= 0.25 \cdot p_{t-1}^e + 0.75 \cdot p_{t-1} + 0.25 \cdot \hat{Y}_t + z_t \Rightarrow \\p_t &= 0.25 \cdot p_{t-1}^e + 0.75 \cdot p_{t-1} + 0.25 \cdot [\hat{Y}_{t-1} + \hat{x}_t - p_t] + z_t \Rightarrow \\p_t &= 0.2 \cdot p_{t-1}^e + 0.6 \cdot p_{t-1} + 0.2 \cdot \hat{Y}_{t-1} + 0.2 \cdot \hat{x}_t + 0.8 \cdot z_t \Rightarrow\end{aligned}$$

**NOTE:** The following two parts of the question ask you to compute the path of the system given an initial shock. In order to earn partial credit for these parts you must show your work in the space provided. By “show your work” we mean that the grader should be able to understand a) what you are computing and b) where the numbers in your computation are coming from.

(C) Starting in the long-run equilibrium described above in period 0, assume that in period  $t=1$  we observe a temporary shock to  $\hat{x}_t$ . In particular,  $\hat{x}_1 = 3, \hat{x}_2 = 2$ . Fill in the following table. (3 points)

$t$	$p_t^e$	$\hat{Y}_t$	$\hat{x}_t$	$p_t$	$z_t$
0	2	0	2	2	0
1	2	<b>0.80</b>	3	<b>2.20</b>	0
2	<b>2.15</b>	<b>0.52</b>	2	<b>2.80</b>	0

Q1.(C) Work Area.

See SPDG.m.

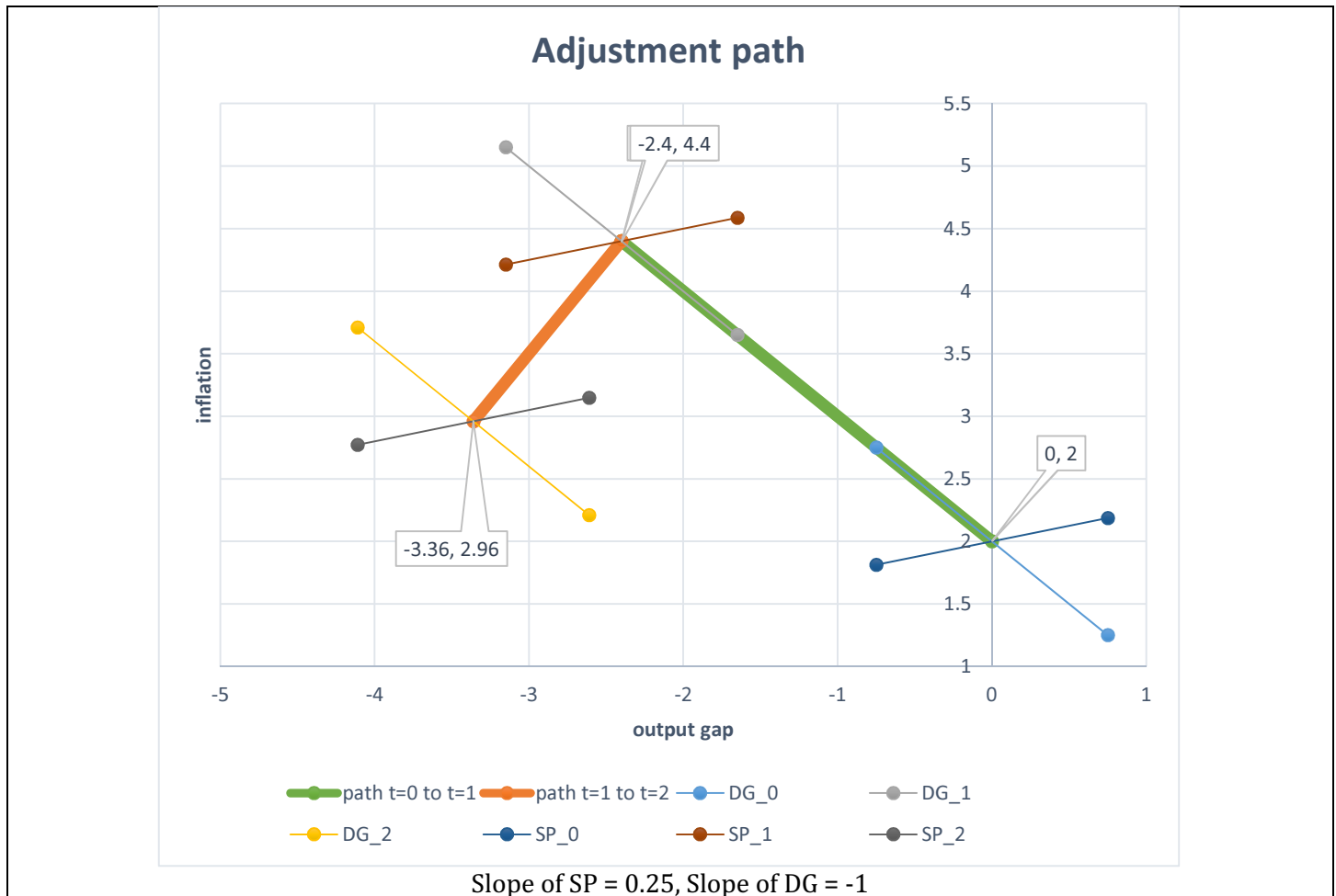
(D) Starting in the long-run equilibrium described above in period 0, assume that in period  $t=1$  we observe a temporary shock to  $z_t$ . In particular,  $z_1 = 3, z_2 = 0$ . Fill in the following table assuming that the central bank is following a neutral policy. (4 points)

$t$	$p_t^e$	$\hat{Y}_t$	$\hat{x}_t$	$p_t$	$z_t$
0	2	0	2	2	0
1	2	<b>-2.4</b>	2	<b>4.4</b>	3
2	<b>3.8</b>	<b>-3.36</b>	2	<b>2.96</b>	0

Q1.(D) Work Area.

See SPDG.m.

(E) Using an 'output gap-inflation' coordinate system draw a graph tracing the economy's adjustment to a temporary supply shock (from Part D) between time t=0 and t=2. On the same graph show the movements of SP and DG curves in time (Hint: draw only 3 pairs of curves, each corresponding to a given time period; label the curves properly). What are the slopes of SP and DG curves? (4 points)



**QUESTION 2: Open IS-LM model (15 points):**

Let the following represent the structure of a **small open economy** with **perfect capital mobility**. Suppose the economy starts with a **flexible exchange rate** regime.

$$C = C_a + 0.8(Y-T),$$

$$C_a = 120, T = 50 + 0.1Y, G = 40,$$

$$I_p = 80 - 6r,$$

$$NX = 120 - 0.12Y - 10e,$$

$$(M/P)^d = 0.2Y - 3r,$$

$$M^s/P = 120.$$

A) Assume that initially foreign and domestic interest rates are equal so that  $r = r^f$  and let the foreign exchange rate  $e=2$ . Find the IS and LM equations. (3 points)

$$k = 1 / (1 - 0.8 + 0.1 * 0.8 + 0.12) = 1 / 0.4 = 2.5$$
$$A_p = 120 - 0.8 * 50 + 40 + 80 - 6r + 120 - 10e = 320 - 6r - 10e = 300 - 6r$$
$$IS: Y = 2.5 * (320 - 6r - 10e) = 800 - 15r - 25e = 750 - 15r$$
$$LM: 120 = 0.2Y - 3r \rightarrow Y = 600 + 15r$$

(B) Find the equilibrium income, interest rate and net exports. (3 points)

$$600 + 15r = 750 - 15r \rightarrow 30r = 150 \rightarrow r = 5 \rightarrow Y = 675$$
$$NX = 120 - 0.12 * 675 - 20 = 19$$

(C) Suppose autonomous planned consumption,  $C_a$ , suddenly goes up from 120 to 170.

(C1) Write down the new IS curve, after the shift in autonomous planned consumption. Keep in mind that this is a small open economy with **perfect capital mobility** and **flexible exchange rates**. *Hint: Express  $Y$  in terms of  $r$  and  $e$ ; don't solve for  $e$*  (2 points)

$$A_p = 170 - 0.8 * 50 + 40 + 80 - 6r + 120 - 10e = 370 - 6r - 10e$$
$$\text{New "IS": } Y = k * A_p = 925 - 15r - 25e$$

(C2) Use the new IS curve and the LM curve to calculate the new output and exchange rate. (2 points)

$$LM: Y = 600 + 15r \rightarrow r = 5, Y = 675$$
$$\text{"IS": } Y = 925 - 15r - 25e = 850 - 25e = 675$$
$$25e = 175 \rightarrow e = 7$$

(D) Imagine that the central bank reacts to this by imposing an exchange rate ceiling of  $e=4$ . Specifically, if  $e$  rises above 4, the central bank will act to bring  $e$  back to down 4. What is the output  $Y$  and interest rate  $r$  now? Draw a diagram of how the IS and LM curves shift in C) and D). (5 points)

**$e=4, r=5$ , since exchange rate cap now binds. Using the new IS equation,  $Y=750$ .**

**Since fixed exchange rate, central bank needs to adjust  $(M^s/P)$  to preserve exchange rate.**

**$(M^s/P)=0.2*750-3*5=135$ .**

**Diagram: IS curve shifts out and then back in really quickly in part C1), LM curve shifts out in part D), causing IS curve to shift out (due to capital inflows depreciating  $e$ ).**

**QUESTION 3: Solow model (14 points)**

Suppose the production function of a closed economy is given by  $Y = AN^{1/2}K^{1/2}$ , where  $K$  is capital,  $N$  is labor and  $A=15$  is total factor productivity.

Furthermore suppose that capital depreciates at  $d=0.2$ , the saving rate is  $s=0.24$ , and population growth is  $n=0.1$ .

(A) Find the steady state level of capital per capita (4 points)

$$Y/N = A(K/N)^{0.5}$$

$$s * A(K/N)^{0.5} = (n+d) * (K/N) \rightarrow K/N = (sA/(n+d))^2 = (3.6/0.3)^2 = 144$$

(B) Find the steady state level of output per capita and investment per capita (2 points)

$$Y/N = A(K/N)^{0.5} = 180$$

$$I/N = s * Y/N = 43.2$$

(C) On a graph of the Solow growth model, show an initial equilibrium (labeled A). Show the effect of an increased population growth,  $n$  (labeled B). Would you expect steady state consumption per capita to go up or down or is the answer ambiguous and depends on the exact change in  $n$ ? Briefly explain your answer. (4 points)

Down.

(D) **When you solve this part, ignore part C.** On a graph of the Solow growth model, show an initial equilibrium (labeled A). Show the effect of an increased total factor productivity,  $A$  (labeled C). Would you expect steady state consumption per capita to go up or down or is the answer ambiguous and depends on the exact change in  $A$ ? Briefly explain your answer. (4 points)

Up.

#### **QUESTION 4: Growth Rates (8 points)**

(A) Suppose real GDP was 100 in 2011 and 120 in 2015. If the country grew on average 5% per year between 2011 and 13, what was the average annual growth rate in 2013-15? (4 Points)

First, find GDP in 2013. This can be solved from:

$$\log(GDP_{13}/GDP_{11}) \frac{1}{2 \text{ years}} \cdot 100 = \Delta GDP_{11:13} \% \Rightarrow GDP_{13} = 100 \cdot \exp(5/50) = 110.5171$$

Then compute the average annual growth rate using the standard growth formula:

$$\Delta GDP_{13:15} = \log(GDP_{15}/GDP_{13}) \frac{1}{2 \text{ years}} \cdot 100 = 4.1161\%.$$

(B) Suppose Country A and Country B both have real GDP equal to 100 in 2000. If Country A grows 2% per year while Country B grows 2.5% per year each year to 2050 what is the difference in real GDP for the two countries in 2050? (i.e. compute  $real\ GDP^A_{2050} - real\ GDP^B_{2050}$ ). (4 Points)

$$A: real\ GDP^A_{2050} = 100 \cdot exp(2/2) = 271.8282.$$

$$B: real\ GDP^B_{2050} = 100 \cdot exp(2.5/2) = 349.0343.$$

Thus,

$$real\ GDP^A_{2050} - real\ GDP^B_{2050} = 271.8282 - 349.0343 = -77.2061.$$

**QUESTION 5: Balance Sheets (8 points)**

Let the following table represent the balance sheet of a bank. The value for “equity” is intentionally left empty.

<b>Assets</b>	<b>Liabilities</b>
Loans: \$40	Deposits: \$60
Government Bonds: \$40	Commercial paper: \$30
Commercial Bonds: \$20	Equity:

A) What is the value of the bank equity? (3 points)

**Total assets are \$100, so total liabilities are \$100. Deposits+commercial paper=\$90, so equity=\$10**

B) What is the leverage ratio for this bank? (2 points)

**(Total assets-equity)/equity=9**

C) Suppose that loans, government bonds, and commercial bonds pay a return of 5% per dollar, while deposits and commercial paper cost 1% per dollar (think of these as interest rates). What are the bank’s net earnings (income-expenses)? (3 points)

**0.05\*100=5, earns \$5 of revenue. 90\*0.01=\$0.9, incurs 90 cents of cost. Net earnings are \$4.1**



### **Part C. Essay Questions (30 minutes)**

**Write your answers clearly with a pen in the blue book. Be sure to PRINT your name on the cover of your blue book before you start. You must write with a pen; no credit will be given for answers written with a pencil.**

1. (15 minutes). Several times in class the recent recession was compared to the recession of 1981-82. Think back to the recession of 1981-82 in terms of all the topics we covered in class – aggregate demand, interest rates, unemployment, inflation, the current account deficit, monetary and fiscal policy. Comparing the early 1980s with the period since 2007, was the 1981-82 recession more or less severe than the 2007-09 recession? What were the primary causes of the 1981-82 recession? What factors were relevant to the end of the recession and to the pace of the subsequent recovery?
2. (15 minutes) In October 2015 and again in November, the U.S. unemployment rate reached 5.0 percent. The last time the unemployment reached as low as 5.0 percent was in April, 2008. Describe similarities and differences in the economic situation of April, 2008, as compared to November, 2015 in terms of as many macroeconomic concepts and variables as you can.

## PART A: Multiple Choice Problems

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

- 1) The wealth effect refers to
  - A) the impact of household real wealth on aggregate supply curve.
  - B) the impact of household real wealth on consumption, savings, and the IS curve.
  - C) the impact of household real wealth on money, prices, and the LM curve.
  - D) the impact of household real wealth on short term and long term interest rates.
  
- 2) All of the following are important ingredients in the 2002-06 U.S. housing bubble EXCEPT
  - A) saving glut.
  - B) financial innovation.
  - C) low interest rates.
  - D) trade deficit.
  
- 3) Normally a current account deficit causes the net international investment position (NIIP) to become more negative. The lecture showed that revaluations prevented the U.S. NIIP from becoming more negative, despite large current account deficits, during which decade?
  - A) 1970s
  - B) 1980s
  - C) 1990s
  - D) 2000s
  
- 4) Suppose we have an economy in which  $G = 1100$ ,  $t = 0.26$ ,  $Y = 3800$ , and  $Y_N = 4000$ . Then  $t$  rises to 0.28 as the same time as  $G$  rises to 1150. The overall impact of this resettling of the fiscal variables is \_\_\_\_\_ because \_\_\_\_\_.
  - A) contractionary, the natural employment deficit falls
  - B) contractionary, the natural employment deficit rises
  - C) contractionary, the actual deficit rises
  - D) expansionary, the actual deficit rises
  - E) expansionary, the natural employment deficit falls
  
- 5) Direct investment in the stock market by the Social Security trust fund
  - A) would be more cost-effective than creating private accounts for each person in the Social Security system.
  - B) does not require that new money be brought into the system.
  - C) would cause the government indirectly to own substantial parts of American companies.
  - D) All of the above.
  
- 6) When a nation's current account deficit exceeds its capital account surplus, the overall \_\_\_\_\_ in the "balance of payments outcome" means that the nation's central bank is \_\_\_\_\_ foreign central banks.
  - A) deficit, borrowing from
  - B) surplus, lending to
  - C) deficit, lending to
  - D) surplus, borrowing from
  
- 7) Consider the diagram for the demand and supply of U.S. dollars. A foreign nation that wants to keep its own currency from appreciating against the dollar takes actions that
  - A) shift the demand curve to the left
  - B) shift the demand curve to the right
  - C) shift the supply curve to the left
  - D) shift the supply curve to the right

- 8) Which of the following does NOT create a demand for Swiss francs?
- A) the desire of a British company to purchase a Swiss factory
  - B) the repayment of a loan from a Swiss company to an Italian bank
  - C) the declaration of a dividend by a Swedish company that has Swiss shareholders
  - D) the rise of the interest rate in Switzerland while other foreign interest rates remain constant
- 9) Suppose that U.S. and British inflation rates are equal, and \$2 exchanges for 1 British pound. Then if U.S. inflation speeds up relative to British inflation, the PPP theory predicts \_\_\_\_\_ of the dollar, so that the pound will cost \_\_\_\_\_ than \$2.
- A) an appreciation, more
  - B) a depreciation, more
  - C) a depreciation, less
  - D) an appreciation, less
- 10) Which of the following most accurately describes the behavior of the U.S. dollar? The dollar \_\_\_\_\_ During 2002-06 and \_\_\_\_\_ during 2014-15.
- A) appreciated; appreciated
  - B) depreciated; depreciated
  - C) appreciated; depreciated
  - D) depreciated; appreciated
- 11) During 1930-31 the U.S. \_\_\_\_\_ the gold standard and \_\_\_\_\_ tariffs.
- A) maintained; lowered
  - B) maintained; raised
  - C) abandoned; lowered
  - D) abandoned; raised
- 12) With flexible exchange rates the fiscal policy multiplier becomes
- A) smaller because the increase in interest rate lowers the exchange rate.
  - B) smaller because the increase in interest rate raises the exchange rate.
  - C) larger because the increase in interest rate raises the exchange rate.
  - D) larger because exports leak out of the economy.
- 13) The slope of the SAS curve is important because it
- A) partially explains the impact of AD stabilization policies on Y and P.
  - B) explains the impact of both supply and demand side policies on Y and P.
  - C) explains the impact of supply side policies on the economy.
  - D) None of the above.
- 14) If there are perfectly flexible prices and the economy is operating at  $Y^N$ , then an increase in government expenditures
- A) will increase real GDP and the price level.
  - B) will lead to complete nominal crowding out and have the price level unchanged.
  - C) will increase nominal GDP and the price level.
  - D) will not lead to complete real crowding out.
- 15) On the SP-DG model diagram plotting the inflation rate against the output gap, the economy moves directly to the south (straight downward) in response to a \_\_\_\_\_ supply shock accompanied by a \_\_\_\_\_ policy for nominal GDP growth
- A) adverse; extinguishing
  - B) adverse; accommodating
  - C) beneficial; extinguishing
  - D) beneficial; accommodating

16) Compared to an economy with staggered overlapping wage contracts, an economy in which wage contracts are renegotiated simultaneously will tend to have

- A) flatter SP curves.
- B) steeper SP curves.
- C) slower shifting of its SP curves.
- D) faster shifting of its SP curves.

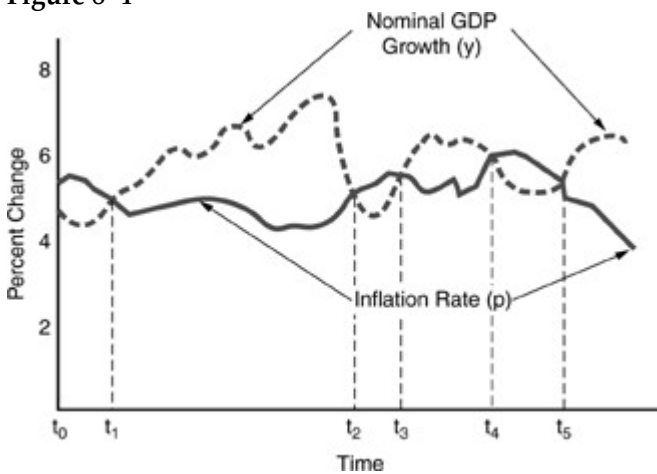
17) Owners of TIPS bonds gain when the nominal interest rate on conventional bonds \_\_\_\_\_ while the inflation rate \_\_\_\_\_ and lose when the nominal interest rate on conventional bonds \_\_\_\_\_ while the inflation rate \_\_\_\_\_.

- A) rises; rises; rises; stays the same
- B) rises; stays the same; rises; rises
- C) rises; rises; falls; stays the same
- D) rises; stays the same; falls; falls

18) In the SP/LP model it is possible to have all short-run equilibrium points run along the LP line if we employ the assumption of \_\_\_\_\_ expectations.

- A) extrapolative
- B) forward-looking
- C) backward-looking
- D) adaptive

Figure 8-4



19) Employing Figure 8-4 above in the time periods  $t_0$  to  $t_1$ , and  $t_4$  to  $t_5$  real GNP is \_\_\_\_\_; from  $t_1$  to  $t_2$ ,  $t_3$  to  $t_4$ , and beyond  $t_5$  real GNP is \_\_\_\_\_.

- A) increasing; increasing
- B) increasing; decreasing
- C) decreasing; decreasing
- D) decreasing; increasing

20) Real income is redistributed from \_\_\_\_\_ in the case of \_\_\_\_\_ inflation.

- A) creditors to debtors, unanticipated
- B) debtors to creditors, unanticipated
- C) debtors to creditors, anticipated
- D) creditors to debtors, anticipated

- 21) Government-paid unemployment benefits \_\_\_\_\_ the unemployment rate according to the theory of \_\_\_\_\_.
- A) reduce; job search
  - B) reduce; structural unemployment
  - C) raise; job search
  - D) raise; structural unemployment
- 22) "Natural unemployment" includes those out of work because of
- A) expected or normal turnover which will always characterize a part of the labor force.
  - B) structural unemployment caused by normal technological change in production.
  - C) a recession.
  - D) A and B.
- 23) Supply shocks are a potential source of higher inflation, unless the government counters with \_\_\_\_\_ policy that \_\_\_\_\_ the money growth rate.
- A) neutral, leaves unchanged
  - B) accommodative, increases
  - C) extinguishing, reduces
  - D) extinguishing, increases
  - E) accommodative, reduces
- 24) In the Solow growth model, given fixed values of  $A$ ,  $s$ ,  $n$ , and  $d$ , the economy has an equilibrium growth rate of real GDP equal to
- A)  $n + d$ .
  - B)  $n - d$ .
  - C)  $s - d$ .
  - D)  $n$ .
  - E)  $s$ .
- 25) As shown in lecture, the decline of the overall unemployment rate between August 2010 and October 2015 occurred primarily in which of the following categories?
- A) job leavers
  - B) job losers
  - C) new entrants
  - D) re-entrants
- 26) The neoclassical model predicts that nations that are initially poor should have
- A) slower growth rates than nations that are rich.
  - B) growth rates equal to those of nations that are rich.
  - C) negative growth rates.
  - D) faster growth rates than nations that are rich.
- 27) Between 2010 and 2015 the unemployment rate declined from 10 to 5 percent but the ratio of employment to the population barely changed. This implies that there was a \_\_\_\_\_ in the \_\_\_\_\_.
- A) fall; natural rate of unemployment
  - B) rise; ratio of employment to the labor force
  - C) fall; labor-force participation rate
  - D) fall; ratio of unemployment to employment

28) In calculating multifactor productivity growth, the elasticity of output to changes in capital (given as "b" in the textbook) is assumed to be

- A) the share of capital income in GDP.
- B) one minus the population growth rate.
- C) the depreciation rate.

29) What is the growth rate of multifactor productivity if  $b = 0.20$ ,  $k = 3$ ,  $n = 1$ , and  $y = 4$ ?

- A) 2.6
- B) 2.2
- C) 1.0
- D) 0.4

30) The course-packet article on India vs China emphasized the lack of \_\_\_\_\_ in \_\_\_\_\_.

- A) political capital; China
- B) political capital; India
- C) public investment; China
- D) public investment; India

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