

**EXAMINATION #3 VERSION C**  
**"Long-Run Economic Growth and Inflation"**  
**October 29, 2014**

INSTRUCTIONS: This exam is closed-book, closed-notes. Simple calculators are permitted, but graphing calculators or calculators with alphabetical keyboards are NOT permitted. Cell phones or other wireless devices are NOT permitted. Point values for each question are noted in brackets. Points will be subtracted for illegible writing or incorrect rounding. Maximum total points are 100.

**I. Multiple choice:** Circle the one best answer to each question. [1 pts each, 11 pts total]

- (1) Potential GDP does not depend on
- total economic capital available.
  - technology or know-how available.
  - stimulus spending by the government.
  - total hours of all workers.
- (2) Unemployment caused by a recession is called
- structural unemployment.
  - frictional unemployment
  - cyclical unemployment.
  - all of the above.
- (3) Government-sponsored employment agencies, which try to match workers to job vacancies submitted by employers, are likely to reduce the unemployment rate according to the
- Phillips curve theory of unemployment.
  - job rationing theories of unemployment.
  - job search theories of unemployment.
  - none of the above.
- (4) The so-called "natural rate of unemployment" does not include
- frictional unemployment.
  - unemployment for less than four weeks.
  - unemployment for more than four weeks.
  - cyclical unemployment.
  - structural unemployment.
- (5) Potential GDP grows faster in the future, the more spending is done now on
- government purchases.
  - net exports.
  - consumption.
  - investment.
  - all of the above.
- (6) If the interest rate rises in the United States and remains constant in other countries, imports will increase and exports will decrease because
- foreign importers will be unable to borrow money.
  - the dollar will appreciate against other currencies.
  - the dollar will depreciate against other currencies.
  - consumers will increase their total spending.
  - exporters will be unable to borrow money.
- (7) Thomas Malthus believed that in the long run, output per person would
- fall to the level of subsistence.
  - fall at a constant rate.
  - grow at a constant rate indefinitely.
  - grow at increasing rates indefinitely.
- (8) Education and training are examples of
- intellectual property rights.
  - natural resources.
  - embodied technical change.
  - human capital.

- (9) Suppose someone discovers a new formula for making plastic. Since this formula could potentially be used by many plastic manufacturers at once, this formula is a
- nonexcludable good.
  - private good.
  - transfer.
  - nonrival good.
  - natural resource.

- (10) Banks create money by
- controlling people's spending through limits on credit cards.
  - collecting currency in their vaults.
  - printing it.
  - accepting deposits and making loans.

- (11) Hyperinflation is caused by excessive
- taxes.
  - government borrowing.
  - government spending.
  - growth of the money supply.
  - consumption spending.

**II. Problems:** Insert your answer to each question in the box provided. Use graphs and margins for scratch work. Only the answers in the boxes will be graded. Work carefully: partial credit is not normally given for questions in this section.

(1) [Measuring the labor force: 3 pts] Indicate whether each person below would be counted by the U.S. Current Population Survey as *employed*, *unemployed*, or *out of the labor force*.

- A 17-year-old who works 20 hours per week in her family's restaurant but does not receive a paycheck.
- An attorney in private practice.
- A person who normally works at a Firestone plant, but is currently on temporary layoff. This person expects to be called back to work next month.


(2) [Measuring the labor force: 8 pts] ] The U.S. Bureau of Labor Statistics reported the following data for January 2013. [Hint: Some of the data are extraneous and not needed for solving this problem.]

Labor force	155.7 million
Not in labor force	89.9 million
Mean duration of unemployment	35.4 weeks
Continued claims for unemployment insurance	3.2 million
Employed	143.4 million

- Compute the number of unemployed people to the nearest tenth of a million.
- Compute the unemployment rate to the nearest tenth of a percentage point.
- Compute the employment-to-population ratio to the nearest tenth of a percentage point.
- Compute the labor force participation rate to the nearest tenth of a percentage point.

	million
	%
	%
	%

(3) [Growth of capital stock: 2 pts] The following data (in chained 2009 dollars) were reported by the U.S. Bureau of Economic Analysis.

Corporate profits in 2011	\$1.8 trillion
Depreciation in 2011	\$1.9 trillion
Government purchases in 2011	\$3.0 trillion
Consumption in 2011	\$10.3 trillion
Gross private investment in 2011	\$2.2 trillion
Exports in 2011	\$1.9 trillion
Private capital stock at end of 2010	\$34.5 trillion
Imports in 2011	\$2.4 trillion
Labor income (compensation of employees) in 2011	\$8.3 trillion

Compute the private capital stock at the end of 2011. [Hint: Some data are extraneous and not needed for this problem.]

\$		trillion
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(4) [Interest rate: 4 pts] Compute the opportunity cost of consuming \$200 today, in terms of forgone consumption **3** years from today. In other words, how much consumption **3** years from now is given up when \$200 is consumed today? Compute your answer to the nearest whole dollar...

a. ... assuming an interest rate of **4%**.

\$	
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b. ... assuming an interest rate of **7%**

\$	
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(5) [Interest rate and GDP shares: 10 pts] Suppose the following three equations relate the shares of consumption (C), investment (I), and net exports (X) in total GDP (Y) to the real interest rate (r) in the long run. In these equations, the GDP shares and the interest rate are expressed as percents.

$$(C/Y) = 73\% - 1 r \qquad (I/Y) = 30\% - 3 r \qquad (X/Y) = 6\% - 2 r$$

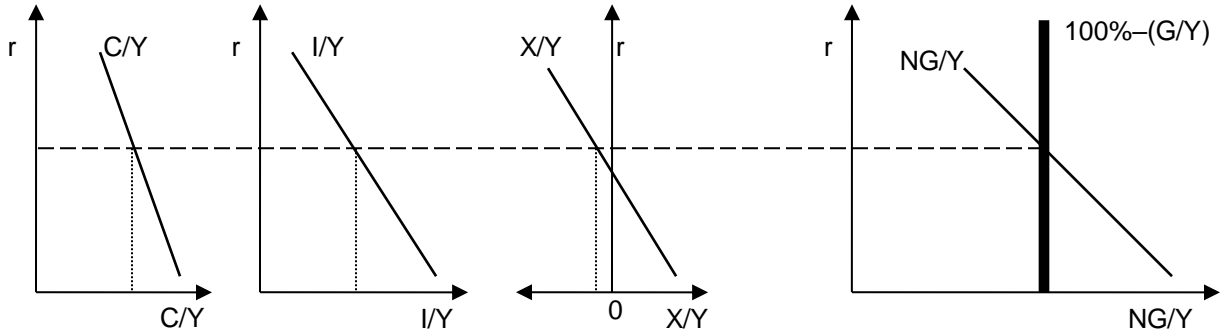
Suppose further that the share of government purchases in GDP (G/Y) is fixed at **21 %**. Compute the following.

[Hint: Check your answer to be sure that the four GDP *spending* shares sum to 100%.]

a. Interest rate (r)	%
b. Consumption's share of GDP (C/Y):	%
c. Investment's share of GDP (I/Y):	%

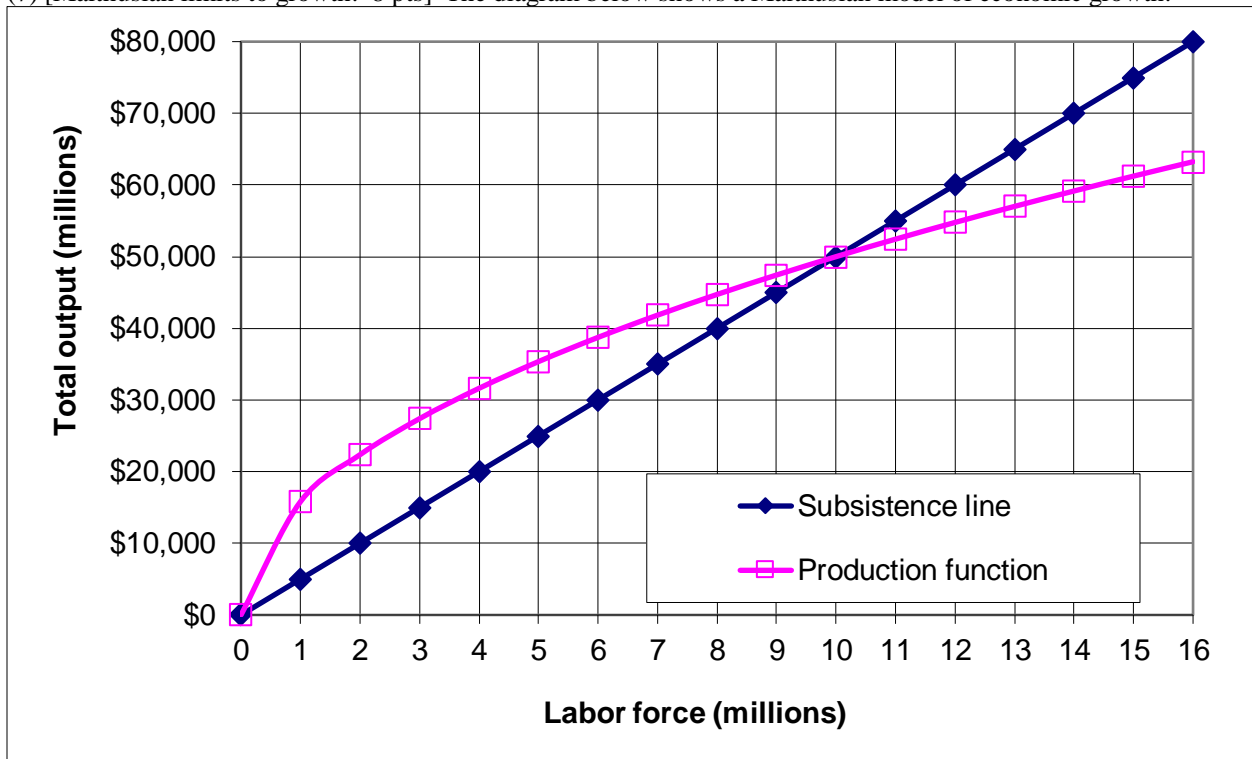
d. Net exports' share of GDP (X/Y):	%
e. Savings as a share of GDP (S/Y):	%

(6) [Interest rate and GDP shares: 16 pts] Suppose government switches from taxing people's income to taxing only people's consumption spending. Use the GDP shares model in the graphs below to answer the following questions.



- Does the consumption share ( $C/Y$ ) curve shift *left*, shift *right*, or remain *unchanged*?
- Does the investment share ( $I/Y$ ) curve shift *left*, shift *right*, or remain *unchanged*?
- Does the net exports share ( $X/Y$ ) curve shift *left*, shift *right*, or remain *unchanged*?
- Does the downward-sloping nongovernment share ( $NG/Y$ ) curve shift *left*, shift *right*, or remain *unchanged*?
- Does the vertical nongovernmental share line (labeled “ $100\%-(G/Y)$ ”) shift *left*, shift *right*, or remain *unchanged*?
- Does the real interest rate ( $r$ ) *increase*, *decrease*, or remain *unchanged*?
- Does the long-run growth rate of potential GDP *increase*, *decrease*, or remain *constant*?
- Justify your answer to part (g).


(7) [Malthusian limits to growth: 8 pts] The diagram below shows a Malthusian model of economic growth.



- According to this model, how much output is required to sustain each worker? In other words, what is the subsistence level of output per worker?
- If the labor force were 5 million, would there be *more than enough* food for everyone, *just enough* food, or *not enough* food?
- If the labor force were 5 million, would the population tend to *increase*, *decrease*, or *remain constant*?
- If the labor force were 14 million, would there be *more than enough* food for everyone, *just enough* food, or *not enough* food?
- If the labor force were 14 million, would the population tend to *increase*, *decrease*, or *remain constant*?
- What is the equilibrium size of the labor force according to this model?
- What is the equilibrium level of annual wages (output per worker) according to this model?
- Suppose the production function shifts down because of an environmental disaster. What will be the eventual new equilibrium level of annual wages (output per worker) according to this model?

\$
million
\$
\$

(8) [Technical change: 4 pts] In Canada over the period 1965 to 1990, the annual growth rate of output per worker was 1.8%, and the annual growth rate of capital per worker was 3.3%. Assume that the share of capital income plus depreciation in national income was about (1/3), as it is in the United States.

- Compute the contribution of capital to productivity growth, to the nearest tenth of a percentage point.
- Compute the contribution of technology to productivity growth, also called the Solow residual, to the nearest tenth of a percentage point.

	%
	%

(9) [Functions of money: 3 pts] For each sentence below, indicate whether money is functioning as a *medium of exchange*, a *store of value*, or a *unit of account*.

- a. Many houses in this neighborhood are assessed at between \$100,000 and \$200,000.
- b. Take money out of your bank account to buy souvenirs!
- c. The merchandise in that store was worth hundreds of thousands of dollars before the fire.


(10) [Measuring the money supply: 8 pts] In January 2012, the U.S. government reported the following data. [Hint: Some of the data are extraneous and not needed for this problem.]

Savings deposits, small time deposits, money-market mutual funds, and other deposits on which check writing is limited or not allowed	\$7.7 trillion
Bank reserves	\$1.5 trillion
Total Federal debt	\$16.0 trillion
Consumer credit outstanding	\$2.8 trillion
Currency	\$1.1 trillion
Travelers checks, demand deposits, and other checkable deposits	\$1.3 trillion
GDP for 2011	\$16.2 trillion
Commercial paper outstanding	\$1.0 trillion

- a. Compute the money supply measure "M1."
- b. Compute the money supply measure "M2."
- c. Compute the velocity of "M1" to the nearest tenth.
- d. Compute the monetary base.

\$		trillion
\$		trillion
\$		trillion

(11) [Money multiplier: 4 pts] Suppose the required reserve ratio were 0.04 and assume banks hold *no* excess reserves. Also suppose that everyone held \$0.12 in currency for every \$1.00 in deposits (that is, the ratio of currency to deposits were 0.12)

- a. Compute the money multiplier.
- b. If the Federal Reserve increased bank reserves by \$50 billion, by how much would the money supply increase?

\$	billion

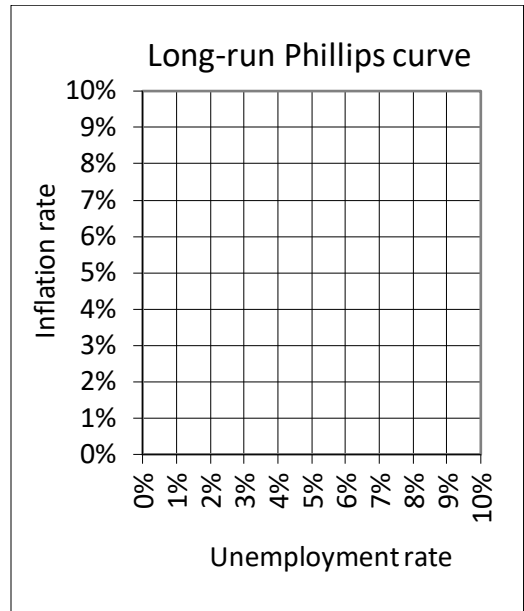
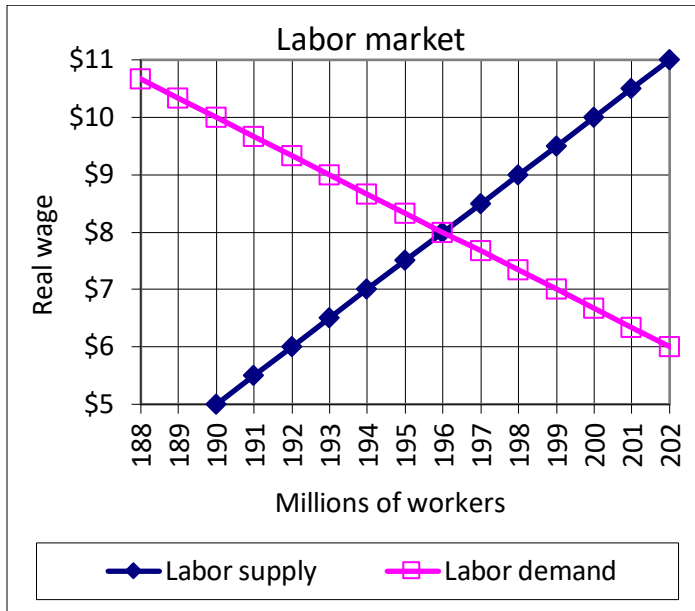
(12) [Quantity equation: 2 pts] Average annual growth rates for various items over the period 1990 to 2010 are reported below. [Hint: Some of the data are extraneous and not needed for this problem.]

Nonfarm employment	0.9%
Money supply (M2)	5.1%
Real investment spending	2.7%
Consumer credit	5.9%
Real GDP	2.5%

Assuming the velocity of money were constant, what should have been the average annual rate of inflation over this period, according to the quantity equation? Give an answer to the nearest tenth of a percentage point.

	%
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(13) [Phelps-Friedman critique of Phillips curve: 14 pts] The graph at left below shows the labor market.



Imagine that the labor market were permitted to reach true equilibrium.

- a. How many workers would be employed?
- b. What would be the real wage?
- c. What would be the unemployment rate?

	million
\$	
	%

Assume for the rest of this problem that this labor market is not permitted to reach true equilibrium. Instead, assume the labor market is characterized by job rationing. That is, assume that unions, a minimum wage law, or employers (seeking to reduce employee turnover) try to keep the real wage in this labor market at \$10.

- d. How many workers are unemployed?
- e. How many workers are employed?
- f. Compute the unemployment rate to the nearest tenth of a percentage point.

	million
	million
	%

Now suppose an unexpected increase in inflation lowers the real wage to \$9 in the short run.

- g. How many workers would be unemployed in the short run?
- h. How many workers are employed in the short run?
- i. Compute the unemployment rate to the nearest tenth of a percentage point.

	million
	million
	%

According to the Phelps-Friedman critique of the Phillips curve...

- j. What is the real wage in the long run?
- k. How many workers are unemployed in the long run?
- l. How many workers are employed in the long run?
- m. What is the long-run unemployment rate, to the nearest tenth of a percentage point?
- n. Draw and label the *long-run* Phillips curve in the graph at right above.

\$	
	million
	million
	%

**III. Critical thinking:** Write a one-paragraph essay answering ONE question below (your choice). [3 pts]

- (1) Consider the following statement. “People who are not working are by definition unemployed.” Do you agree or disagree? Why?
- (2) Consider the following statement. “People and their well-being are what really matter. The government should encourage consumption spending, not investment spending.” Do you agree or disagree? Why or why not?

Please circle the question you are answering and write your answer below. Full credit requires correct economic reasoning, legible writing, good grammar including complete sentences, and accurate spelling.

[end of exam]