EXAMINATION #3 VERSION B
"Long-Run Economic Growth and Inflation"
November 6, 2012

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 pt each, 15 pts total]

(1) Today, we are in the _____ quarter of 2012.
a. first.
b. second.
c. third.
d. fourth.
e. fifth.

(2) Unemployment that results from normal turnover of workers and businesses, is called
a. structural unemployment.
b. frictional unemployment
c. cyclical unemployment.
d. all of the above.

(3) The theory that unemployment is caused by wages that are above the equilibrium (or market-clearing) level is called
a. "search."
b. "Phillips curve."
c. "job rationing."
d. "human capital."

(4) If the interest rate rises, then the opportunity cost of consumption today (in terms of foregone consumption in the future)
a. rises.
b. falls.
c. remains constant.
d. cannot be determined.

(5) If the real interest rate falls and nothing else changes, then spending on buildings, equipment, vehicles, computers, networks, and software will
a. increase.
b. decrease.
c. remain unchanged.
d. cannot be determined from information given.

(6) If the interest rate falls in the United States and remains constant in other countries, imports will decrease and exports will increase because
a. foreign importers will be unable to borrow money.
b. the dollar will appreciate against other currencies.
c. the dollar will depreciate against other currencies.
d. consumers will increase their total spending.
e. exporters will be more able to borrow money.

(7) Thomas Malthus believed that in the long run, output per person would
a. fall at a constant rate.
b. grow at a constant rate indefinitely.
c. grow at increasing rates indefinitely.
d. converge to the level of subsistence.

(8) New designs for more fuel-efficient trucks can only be implemented when new trucks are purchased and put into service. This phenomenon is called
a. "technical diffusion".
b. "embodied technical change".
c. "human capital".
d. "learning by doing".

(9) "Human capital" means
a. retirement savings plans.
b. people-friendly businesses.
c. ergonomically designed equipment.
d. education and training.

(10) 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
a.   transfer.
b.   nonrival good.
c.   natural resource.
d.   nonexcludable good.
e.   private good.

(11) A key function of any central bank is to
a.   design and print currency.
b.   make loans to consumers.
c.   promote investment spending by buying corporate bonds.
d.   control the supply of money.

(12) Assume the required reserve ratio is 0.1 and that banks hold no excess reserves. If people like to hold $0.50 in currency for every $1.00 they hold in bank accounts, then the money multiplier equals
a.   1.6.
b.   2.0.
c.   2.5.
d.   6.667.
e.   10.0.

(13) The *velocity* of money is defined as
a.   the percent change in the money supply from one year to the next.
b.   consumption spending minus total income.
c.   GDP divided by the money supply.
d.   the growth rate of the money supply minus the growth rate of real GDP.

(14) Most economists believe that a higher rate of inflation will, in the long run, bring
a.   no change in the rate of unemployment.
b.   a lower rate of unemployment.
c.   a higher rate of unemployment.
d.   cannot be determined from information given.

(15) Hyperinflation is caused by excessive
a.   government borrowing.
b.   government spending.
c.   growth of the money supply.
d.   consumption spending.
e.   taxes.

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) [Aggregate production function: 5 pts] According to the theory of the aggregate production function, *potential* GDP depends on which of the following? Answer *true* or *false*.
   a. The level of stimulus spending by the federal government.

   b. The level of technology, or "know-how," in the economy.

   c. The money supply.

   d. The number of workers and the average number of hours worked by each of them.

   e. The amount of physical or economic capital available.

(2) [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. A person who is not currently working, but applied for a job last week.

   b. An attorney in private practice.

   c. A person who is not currently working, but checks online job advertisements every week. This person last applied for a job two weeks ago.

(3) [Measuring the labor force: 8 pts]] The U.S. Bureau of Labor Statistics reported that in October 2010, 139.1 million people were employed, 14.6 million people were unemployed, and 84.8 million working-age people were not in the labor force.

a. Compute the working-age population to the nearest tenth of a million.

a.	million
b.	%
c.	%
d.	%

b. Compute the employment-to-population ratio to the nearest tenth of a percentage point.

c. Compute the labor force participation rate to the nearest tenth of a percentage point.

d. Compute the unemployment rate to the nearest tenth of a percentage point.

(4) [Growth of capital stock: 2 pts] The following data (in chained 2005 dollars) were reported by the U.S. Bureau of Economic Analysis.

Depreciation in 2007	$1,394 billion
Government purchases in 2007	$2,434 billion
Consumption in 2007	$9,263 billion
Investment in 2007	$2,109 billion
Exports in 2007	$1,554 billion
Private capital stock at end of 2006	$30,169 billion
Imports in 2007	$2,203 billion
Labor income (compensation of employees) in 2007	$7,856 billion
Corporate profits in 2007	$1,511 billion

Compute the private capital stock at the end of 2007. [Hint: Some data are extraneous and not needed for this problem.]

$ _____ billion

(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.

$$(C/Y) = 71\% - 1\,r \qquad (I/Y) = 24\% - 3\,r \qquad (X/Y) = 4\% - 1\,r$$

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: 12 pts] Suppose the government purchases share of GDP (that is, G/Y) increases. Use the spending allocation model to answer the following questions. [Hint: Use the graphs below for scratch work.]

a. Does the long-run real interest rate (r) *increase, decrease*, or remain *constant*?

b. Does the share of consumption spending (C/Y) *increase, decrease*, or remain *constant*?

c. Does the share of investment spending (I/Y) *increase, decrease*, or remain *constant*?

d. Does the share of net exports (X/Y) *increase, decrease*, or remain *constant*?

e. Does the long-run growth rate of real GDP *increase, decrease*, or remain *constant*?

f. Justify your answer to part (e).
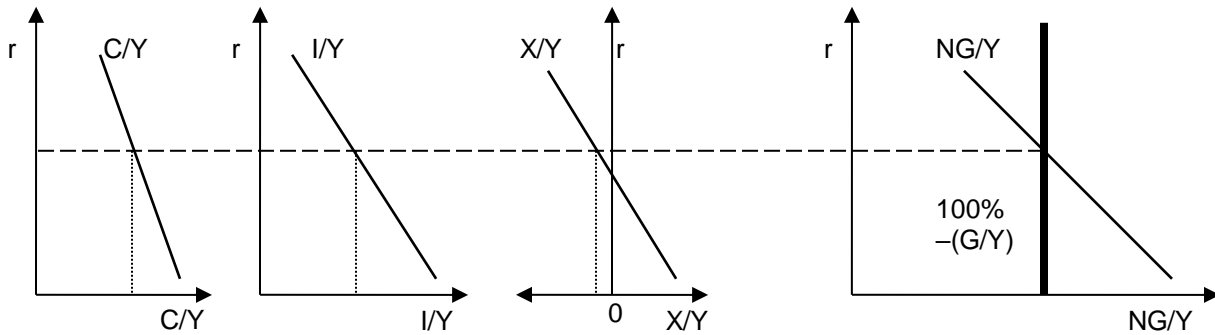
(7) [Malthusian limits to growth: 8 pts] The diagram below shows a Malthusian model of economic growth.
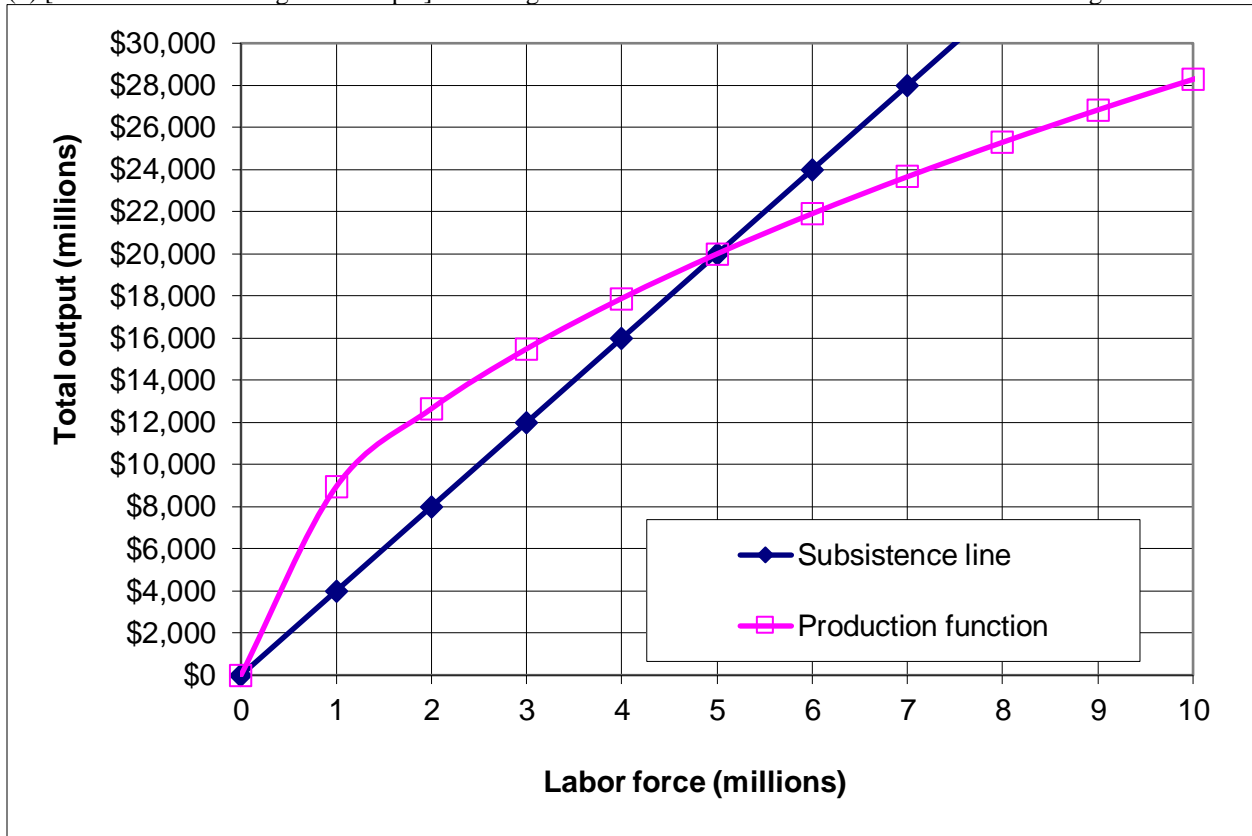
a. According to this Malthusian model, how much output is required to sustain each worker? In other words, what is the subsistence level of output per worker?

$

b. If the labor force were 2 million, would there be *more than enough* food for everyone, *just enough* food, or *not enough* food?

c. If the labor force were 2 million, would the population tend to *increase, decrease, or remain constant*?

d. If the labor force were 6 million, would there be *more than enough* food for everyone, *just enough* food, or *not enough* food?

e. If the labor force were 6 million, would the population tend to *increase, decrease, or remain constant*?

f. What is the equilibrium size of the labor force according to this model?

million

g. What is the equilibrium level of annual wages (output per worker) according to this model?

$

h. Suppose the production function shifts down due to an environmental disaster. What will be the new equilibrium level of annual wages (output per worker) according to this model?

$

(8) [Technical change: 4 pts] Over the period 1965 to 1990, the annual growth rate of output per worker in India was 2.5% and the annual growth rate of capital per worker was 3.6%. Assume that the share of capital income plus depreciation in national income was about **(1/3),** as it is in the United States.

a. Compute the contribution of capital to productivity growth, to the nearest tenth of a percentage point.

%

b. Contribute the contribution of technology to productivity growth, also called the Solow residual, to the nearest tenth of a percentage point.

%

(9) [Functions of money: 4 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. Every retirement portfolio should include stocks, bonds, and savings accounts.

b. A used Corvette might be worth $50,000.

c. I need money today for groceries.

(10) [Measuring the money supply: 10 pts] The U.S. government reported the following data for July 2009. [Hint: Some of the data are extraneous and not needed for this problem.]

GDP	$13,974 billion
Federal debt held by the public	$7,166 billion
Index of industrial production	84.4
Travelers checks, demand deposits, and other checkable deposits	$807 billion
Consumer credit outstanding	$2,497 billion
Currency	$855 billion
Credit card balances	$909 billion
Bank reserves	$795 billion
Savings deposits, small time deposits, money-market mutual funds, and other deposits on which check writing is limited or not allowed	$6,793 billion

a. Compute the money supply measure "M1." $ billion

b. Compute the money supply measure "M2." $ billion

c. Compute the monetary base. $ billion

d. Compute the money multiplier for "**M2**" to the nearest tenth.

e. Compute the velocity of money ("**M2**") to the nearest tenth.

(11) [Quantity equation: 2 pts] Growth rates for various items over the period 1985-1995 are reported below. [Hint: Some of the data are extraneous and not needed for this problem.]

Real GDP (2005 dollars)	2.9 %
Exports (2005 dollars)	9.0 %
Employment	1.5 %
Money supply (M2)	3.8 %
Imports (2005 dollars)	6.1 %

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.   %

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

Labor market

Long-run Phillips curve
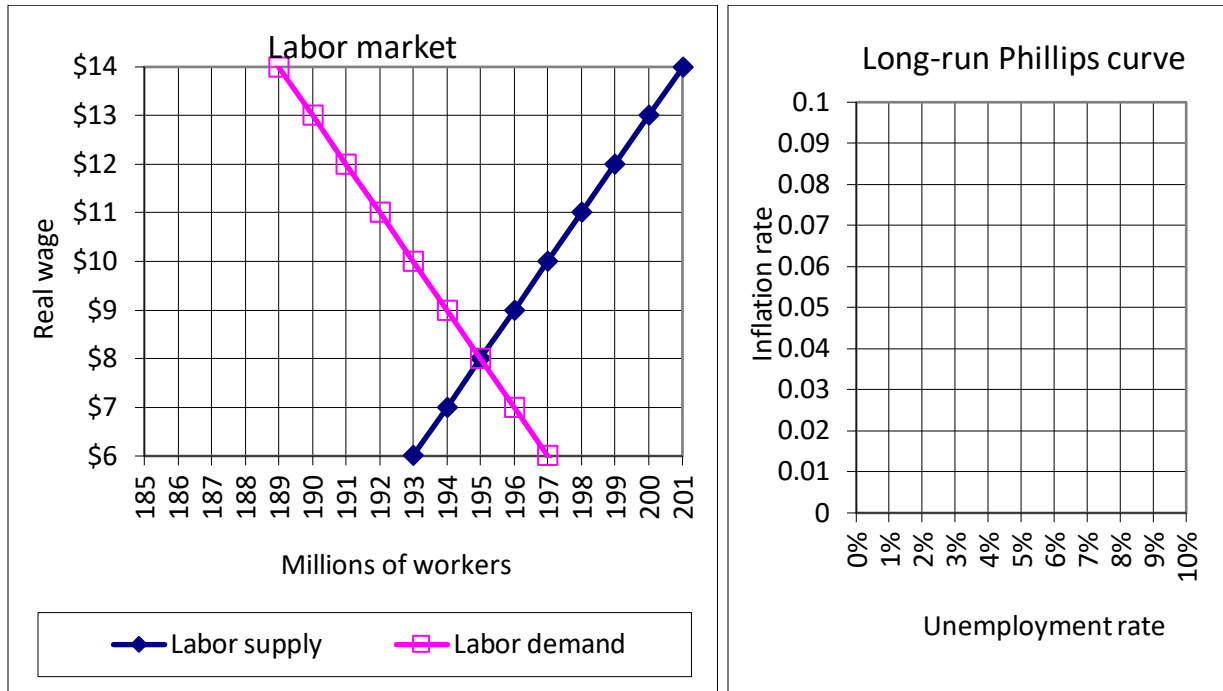
Imagine that the labor market were permitted to reach true equilibrium.
  a. How many workers would be employed?

	million

  b. What would be the real wage?

$	

  c. What would be the unemployment rate?

	%

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 $13.

  d. How many workers are unemployed?

	million
	million
	%

  e. How many workers are employed?

  f. Compute the unemployment rate to the nearest tenth of a percentage point.

Now suppose an unexpected increase in inflation lowers the real wage to $11 in the short run.
  g. How many workers would be unemployed in the short run?

	million
	million
	%

  h. How many workers are employed in the short run?

  i. Compute the unemployment rate to the nearest tenth of a percentage point.

According to the Phelps-Friedman critique of the Phillips curve…
  j. What is the real wage in the long run?

$	
	million
	million
	%

  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.

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. "Consumption is about two-thirds of GDP, so to promote long-run growth, the government should encourage consumers to spend more." Do you agree or disagree? Justify your answer using the spending allocation model of GDP shares.

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]