

There are 26 multiple choice questions for 2 pts. each, and three written questions totalling of 40 pts.  
Total points on exam: 92. Look over the whole test before you begin. Good luck!

1) Suppose the BLS surveys people about their activities and gets the following results.

	Number of people (in millions)
Employed or self-employed	3
Not employed, searching for a job	1
Not employed, not searching for a job	1
Not employed, retired	2

What is the unemployment rate as calculated by the BLS?

- a) 10%      b) 20%      c) 25%      d) 33%      e) None of the above

2) If the unemployment rate is 10 percent (one-tenth) and the number of unemployed workers is two million, how many people are employed?

- a) 18 million      b) 14 million      c) 10 million      d) 8 million      e) None of the above

3) What tends to happen to the statistical unemployment rate if a large number of students graduate from college and start looking for jobs?

- a) Increase      b) Decrease      c) No change      d) Depends on whether the students had been living with their parents or independently      e) None of the above

4) Which of those people would not be counted as unemployed in our national statistics, but is unemployed on the economist's theoretical definition?

- a) Harry does not have a job. He is a full-time college student.  
b) Melissa owns and manages a Burger King franchise.  
c) Aloysuis is a recent high-school graduate who does not have a job. He applies for many jobs and goes on many job interviews. He will take a job that pays \$200,000 a year or more, but not a job that pays less than that.  
d) Cecilia was an autoworker until the plant shut down. She has not applied for any jobs or had any interviews recently because no employer within commuting distance of her town is hiring. She will take the first job she is offered, at any wage.  
e) Harrison is a recent college graduate who does not have a job. He spends all of his time in his mother's basement watching "Rick and Morty" and huffing aerosols.

5) Which of those people would be counted as unemployed in our national statistics, but is not unemployed on the economist's theoretical definition?

- a) Harry does not have a job. He is a full-time college student.  
b) Melissa owns and manages a Burger King franchise.  
c) Aloysuis is a recent high-school graduate who does not have a job. He applies for many jobs and goes on many job interviews. He will take a job that pays \$200,000 a year or more, but not a job that pays less than that.  
d) Cecilia was an autoworker until the plant shut down. She has not applied for any jobs or had any interviews recently because no employer within commuting distance of her town is hiring. She will take the first job she is offered, at any wage.  
e) Harrison is a recent college graduate who does not have a job. He spends all of his time in his mother's basement watching "Rick and Morty" and huffing aerosols.

6) Which of the following is a Laspeyres price index?

- a) CPI   b) PCE price index   c) GDP price index   d) Nominal GDP   e) None of the above

7) Which of the following is a Paasche price index?

- a) CPI   b) PCE price index   c) GDP price index   d) Nominal GDP   e) None of the above

8) In this table, what should the last column be?

Year	Real GDP Quantity index	Nominal GDP	Chained (2002) dollar real GDP
2001	0.95	900	_____
2002.	1.00	1000	_____
2003.	1.05	1050	_____

Year	a)	b)	c)	d)	e) none of those is correct
2001	900	950	900	950	
2002	1000	1000	1000	1000	
2003	1050	1050	1100	1100	

9) Suppose that a country's GNP is larger than its GDP. Which of the following is especially likely to be true for that country?

- a) total value-added of enterprises located in the country is also greater than its GDP  
b) total value-added of enterprises in the country is less than its GDP  
c) the residents of the country own a lot of stock in companies located outside the country  
d) residents of foreign countries own a lot of stock in companies located in the country  
e) none of the above

10) The statistical authorities of the country of Pontevedro use the Laspeyres formula to calculate the country's GDP price index. Prices of which goods and services will be included in this index?

- a) All goods and services purchased by Pontevedran households  
b) All goods and services produced by firms located in Pontevedro, excluding goods and services that are material inputs to production of other goods and services in Pontevedro  
c) All goods and services produced by firms located in Pontevedro, excluding goods and services that are capital inputs to production of other goods and services in Pontevedro  
d) All goods and services produced by firms located in Pontevedro, excluding goods and services that are exported to other countries  
e) None of the above

11) Suppose that the statistical authorities of Pontevedro stop using a Laspeyres formula to create the country's GDP price index, and start using a chain-weighted Fisher ideal index to calculate that index. What is likely to happen to the rate of inflation in the index?

- a) Likely to fall  
b) Likely to rise  
c) Likely to remain the same, since the same prices will go into the index  
d) Can fall or rise depending on whether the residents of Pontevedro own a lot of stock in foreign companies  
e) None of the above

12) Why do we think that real aggregate production functions are Cobb-Douglas?

- a) When a country breaks up into two countries, total real GDP of the two countries is usually about the same as the real GDP of the original country before the break-up.  
b) When there is a large increase in employment in a country but the capital stock remains about the same, real wages fall.  
c) When there is an increase in employment *or* an increase in the capital stock, real GDP in a country increases.  
d) The share of national income going to labor has remained fairly stable over history.  
e) None of the above

13) Why do we think that real aggregate production functions have constant returns to scale?

- a) When a country breaks up into two countries, total real GDP of the two countries is usually about the same as the real GDP of the original country before the break-up.
- b) When there is a large increase in employment in a country but the capital stock remains about the same, real wages fall.
- c) When there is an increase in employment *or* an increase in the capital stock, real GDP in a country increases.
- d) The share of national income going to labor has remained fairly stable over history.
- e) None of the above

14) Why do we think that real aggregate production functions have diminishing marginal product of labor?

- a) When a country breaks up into two countries, total real GDP of the two countries is usually about the same as the real GDP of the original country before the break-up.
- b) When there is a large increase in employment in a country but the capital stock remains about the same, real wages fall.
- c) When there is an increase in employment *or* an increase in the capital stock, real GDP in a country increases.
- d) The share of national income going to labor has remained fairly stable over history.
- e) None of the above

For the following questions, I have left extra space for you to do the calculus stuff.

15) A country's aggregate production function is  $Y = 10K^{1/2}L^{1/2}$ . What is the marginal product of labor?

- a)  $10K^{1/2}L^{-1/2}$
- b)  $10K^{-1/2}L^{1/2}$
- c)  $5K^{1/2}L^{-1/2}$
- d)  $5K^{-1/2}L^{1/2}$
- e) None of the above

16) A country's aggregate production function is  $Y = 10K^{1/2}L^{1/2}$ . What is the marginal product of capital?

- a)  $10K^{1/2}L^{-1/2}$
- b)  $10K^{-1/2}L^{1/2}$
- c)  $5K^{1/2}L^{-1/2}$
- d)  $5K^{-1/2}L^{1/2}$
- e) None of the above

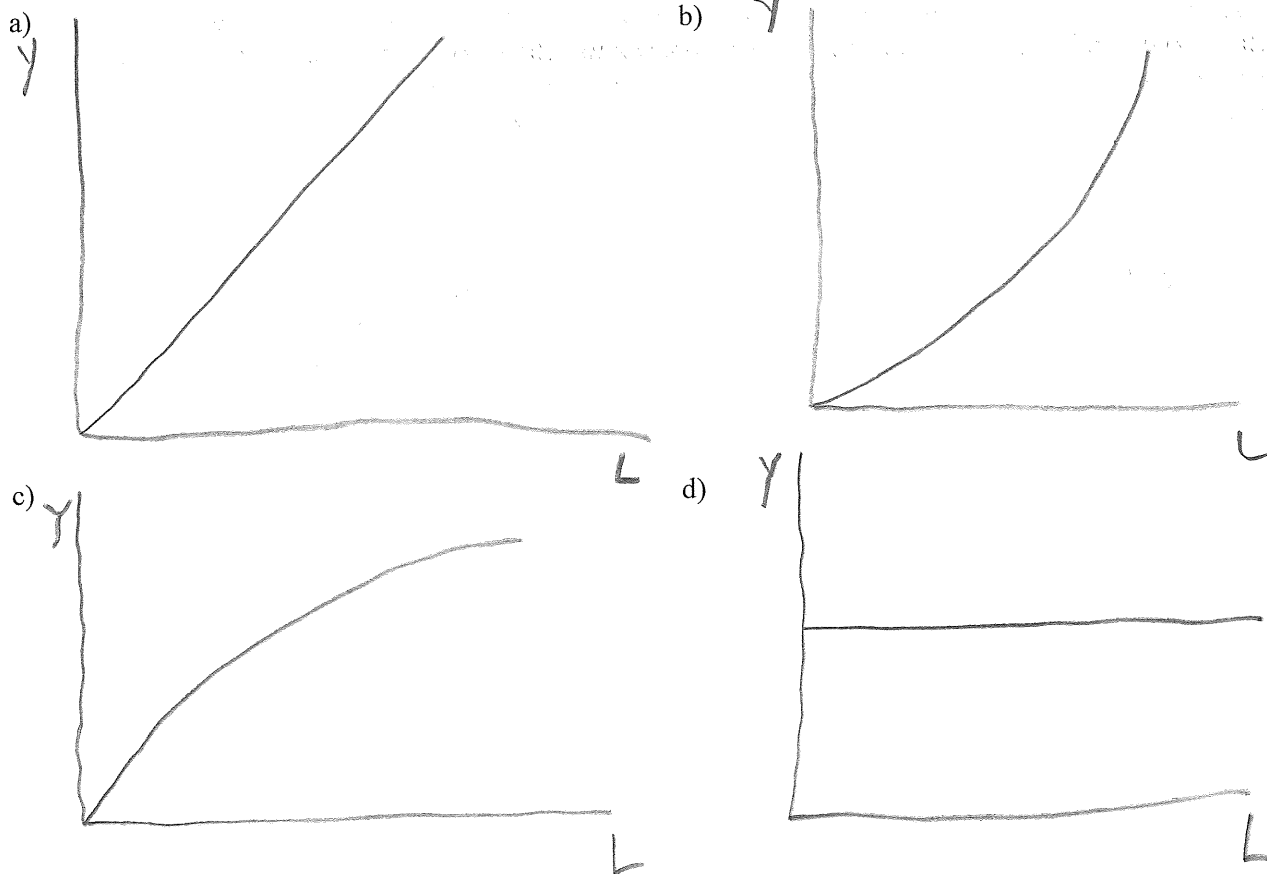
17) A country's aggregate production function is  $Y = 10 + 2K^{1/2}L + L^2$ . What is the marginal product of labor?

- a)  $10 + K^{-1/2}L + 2L$
- b)  $K^{-1/2} + 2$
- c)  $K^{-1/2} + 2L$
- d)  $K^{-1/2}L$
- e)  $2K^{1/2} + 2L$

18) A country's aggregate production function is  $Y = 10 + 2K^{1/2}L + L^2$ . What is the marginal product of capital?

- a)  $10 + K^{-1/2}L + 2L$
- b)  $K^{-1/2} + 2$
- c)  $K^{-1/2} + 2L$
- d)  $K^{-1/2}L$
- e)  $2K^{1/2} + 2L$

The following information is for questions 19) - 20) The graphs below show the levels of output from an aggregate production function when capital is held fixed at a certain quantity (for example, 10 units) and the quantity of labor input varies.



- 19) Which of the graphs might depict the aggregate production function in an economy like the following one.  
 If there are 100 units of labor employed in the economy and you add 1 more unit of labor, you get 20 more units of output.  
 If there are 110 units of labor employed in the economy and you add 1 more unit of labor, you get 20 more units of output.  
 a) b) c) d) e) None of the above

- 20) Which of the graphs might depict the aggregate production function in an economy like the following one.  
 If there are 100 units of labor employed in the economy and you add 1 more unit of labor, you get 20 more units of output.  
 If there are 110 units of labor employed in the economy and you add 1 more unit of labor, you get 15 more units of output.  
 a) b) c) d) e) None of the above

- 21) Euler's Theorem can be applied to the case of an aggregate production function, if and only if, a certain condition holds for that production function. Which of the following is it?  
 a) The marginal product of capital is diminishing  
 b) The marginal product of labor is diminishing  
 c) The production function has increasing returns to scale  
 d) The production function has diminishing returns to scale  
 e) None of the above

The following information is for questions 22) - 26). They are about value-added, GDP and GNP. There are three industries in the country of Narnia: farms, bakeries and beer breweries. Farmers rent farms (land, which of course is used over and over forever, and buildings) from the nobility, hire labor and grow wheat. All their wheat is sold to bakeries and breweries. Bakeries use wheat to make bread in brick ovens. Breweries use wheat to make beer in metal tanks. Both ovens and metal tanks wear out slowly over time, but must eventually be replaced.

Most of the nobility live in Narnia. But some are residents of another country, Archenland. Also, some land in Archenland is owned by nobles who live in Narnia.

	<u>Total revenue</u>	<u>Cost of labor</u>	<u>Cost of wheat</u>	<u>Rent paid to nobles</u>	<u>Cost of buying new Ovens</u>	<u>Metal tanks</u>	<u>Value-added</u>
Farms	15	7		3			_____
Bakeries	25	5	10		5		_____
Breweries	20	10	5			3	_____

Rent paid by Narnian farmers to noble residents in Archenland: 2

Rent paid by Achenland farmers to noble residents in Narnia: 3

GDP of Narnia: \_\_\_\_\_

GNP(or GNI) of Narnia: \_\_\_\_\_

- 22) What is value-added in farms?      a) 5    b) 10    c) 15    d) 20    e) None of the above
- 23) What is value-added in bakeries?      a) 5    b) 10    c) 15    d) 20    e) None of the above
- 24) What is value-added in breweries?      a) 5    b) 10    c) 15    d) 20    e) None of the above
- 25) What is GDP of Narnia?      a) 35    b) 40    c) 45    d) 50    e) None of the above
- 26) What is GNP (or GNI) of Narnia?      a) 35    b) 40    c) 45    d) 50    e) None of the above

### Written questions

I) Using the algebraic "Z" method, *show* whether each of these production functions does or does not have constant returns to scale. SHOW YOUR WORK.

A) 5 pts  $Y = 10 + K^{1/2}L^{1/2}$  Does it have constant returns? \_\_\_\_\_ (yes or no)

B) 5 pts  $Y = K^{1/3}L^2$  Does it have constant returns? \_\_\_\_\_ (yes or no)

II) 15 pts total. This question is about price indexes: Laspeyres, Paasche and Fisher ideal. Fill in the blank columns. **Show your work in the spaces below.** I must see how you got your answers.

A) Fill in the blank columns for the year 1953 and 1954. Note the base year is 1953.

Year	<u>Spam</u>		<u>Beer</u>		<u>Price indexes, base year 1953 (base year = 1)</u>		
	<u>Price</u>	<u>Quantity</u>	<u>Price</u>	<u>Quantity</u>	<u>Laspeyres</u>	<u>Paasche</u>	<u>Fisher ideal</u>
1953	1	2	2	1	_____	_____	_____
1954	2	2	8	1	_____	_____	_____

Calculations for column labeled "Laspeyres"

Calculations for column labelled "Paasche"

Calculations for column labeled "Fisher"

B) Fill in the blank columns for the year 1954 and 1955. Note the base year here is 1954.

Year	<u>Spam</u>		<u>Beer</u>		<u>Price indexes, base year 1954 (base year = 1)</u>		
	<u>Price</u>	<u>Quantity</u>	<u>Price</u>	<u>Quantity</u>	<u>Laspeyres</u>	<u>Paasche</u>	<u>Fisher ideal</u>
1954	8	1	2	1	_____	_____	_____
1955	2	0	8	2	_____	_____	_____

Calculations for column labeled "Laspeyres"

Calculations for column labelled "Paasche"

Calculations for column labeled "Fisher"

C) From the two price indexes you made above, make a chain-weighted Fisher ideal index that covers all three years, with 1953 as the base year.

<u>Year</u>	<u>Chain-weighted Fisher idea price index, base year 1953 (base year = 1)</u>
1953	_____
1954	_____
1955	_____

III) 15 pts. total. Consider an economy in which all markets are perfectly competitive, GDP is equal to GNP, all units of labor  $L$  are homogenous, and so are all units of capital  $K$ . Also, "Euler's theorem" holds.

Using the information below, tell me the values of the following things. I am looking for numbers here. Yes, the information below *does* imply the values of all the things I am asking for.

Marginal product of labor (MPL): \_\_\_\_\_

Marginal product of capital (MPK): \_\_\_\_\_

Nominal GDP: \_\_\_\_\_

Share of national income going to labor: \_\_\_\_\_

Share of national income going to capital: \_\_\_\_\_

Information to use:

The wage per unit of labor is \$2.

The rental rate per unit of capital is \$3.

The price level (the price of a unit of output) is \$1.

Total units of labor ( $\bar{L}$ ) is 10.

Total units of capital ( $\bar{K}$ ) is 5.