Section day & time: _____

First midterm exam

Total points on exam: 135. If you need more room for an answer, use the back page.

If I ask for an explanation, your grade on the quesiton will depend mostly on the explanation. Good luck!

1) 10 pts. If the unemployment rate is 10 percent (or one-tenth) and the number of unemployed workers is two million, how many people are employed?   _____(number employed)

2) 10 pts. Fill in the numbers in the last column of this table.

Year	Real GDP Quantity index	Nominal GDP	Chained (2002) dollar real GDP
2001	0.95	900	_____
2002	1.00	1000	_____
2003	1.10	1050	_____

3) 15 pts. There are three kinds of firms 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.

Fill out the blank spaces (missing items) in the following table.

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

Rent paid by Narnian farmers to nobles resident in Archenland: 2

Rent paid by Achenland farmers to nobles resident in Narnia: 3

GDP of Narnia: _____

GNP(or GNI) of Narnia: _____

4) 10 pts. Here are some statistics about an economy. Using the statistics, calculate the average annual rate of growth in "total factor productivity" from the year 1966 to 1986. There is space below for your calculations.

Average annual rate of growth in total factor productivity from 1966 to 1986: _____ percent

GDP in 1966: $50 million
Total wages, salaries, and other payments to employees in 1966: $25 million.
From 1966 to 1986, average annual rate of growth in:
                    Real GDP 5%
                    Labor input 4%
                    Capital stock 6%

5) 10 pts. Why do we think that real aggregate production functions, or real countries across the world, must have constant returns to scale?

6) 15 pts. Why do we think (or why did we used to think) that the aggregate production function is of the Cobb-Douglas form?

7) 15 pts. Why is a Fisher (or "Fisher ideal") price index the *best* kind of price index, giving the best estimate of inflation?

8) 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 $Y = 2K + 3L$ 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)

9) Consider the aggregate production function $Y = K^{1/2}L^2 + 3L$

a) 5 pts. Use *calculus* to get an expression that gives the "marginal product of labor."

b) 5 pts. Use *calculus* to get an expression that gives the "marginal product of capital."

c) 5 pts. Which factor or factors have *diminishing* marginal product? _____ (capital, labor, or both)
Explain how you know:

d) 5 pts. If $K=9$ and $L=1$, what is the marginal product of *labor*? (I am looking for a number here.) _____

10) 20 pts. 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 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: _____

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.