Econ 102
Measuring National Income and Prices
Due in Sections, January 19, 2007

1. Measurement of National Income and Decomposing GDP

This question is designed to see if you understand how Gross Domestic Product (GDP) is measured. For each transaction answer the following questions:

- How is the GDP of the countries mentioned affected?

- In which component of each country's GDP (C, I, G, or NX) will the transaction appear?

Before you begin, you should define exactly what GDP is. This definition should help you answer the question. Each one of your answers should be able to satisfy this definition.

i.   Households in the U.S. go on a binge of buying and eating U.S.-produced popcorn.

ii.   J.B., who is a Canadian citizen living in Canada, buys a new car in Ann Arbor which was built by a firm based in Michigan.

iii.   US Steel Corporation purchases a new $10 million steel rolling machine for its factory. Assume the steel rolling machine was produced in Japan.

iv.   The city of Ann Arbor purchases a new, German-made bus for $150,000.

v.   The University of Michigan, a public school, builds a new library for $20 million.

vi.   Aunt Jane buys a new home in Ann Arbor, MI in 2003 for $600,000. The home has been built in 2003 from $40,000 worth of bricks produced in Canada in the same year.

vii.   A TV assembly plant in Mexico buys $100 worth of components from US factories, assembles a TV, and sells it to the Ann Arbor Best Buy store for $350. A Canadian buys it in Ann Arbor for $400 while on his vacation.

viii.   Due to the current favorable exchange rate, EU citizens start purchasing shares on the US stock market.

ix.   You sell your copy of Mankiw's *Brief Principles of Macroeconomics* back to Ulrich's for $15 after a very successful semester.

x.   Your GSI spends 5 hours fixing the broken wheel on his car; a job that would have cost him $300 at the local service station.

2. The GDP Deflator and the Consumer Price Index

Price indices are very important in macroeconomics. We use them to measure inflation and adjust for its effects. This problem is designed to help us calculate and understand price indices.

There are many price indices. One is the **Consumer Price Index** (CPI), commonly reported in the news. The CPI calculates the cost of a certain basket of consumer goods and services each month. The change in the cost of this basket is the basis for computing the increase in the cost of living.

Another price index of interest in macroeconomics is the **GDP Deflator**, which is used to calculate real (i.e. deflated) GDP. While a fixed basket of goods and services is used in calculating the CPI, the GDP deflator is measured using the set of final goods and services that is actually produced in the economy in a given time period.

Suppose the economy of Ann Arbor produces 4 goods, but only strawberries, ice cream, and sushi are consumer goods. Coolers are also final goods, but are not bought by consumers. The total production of all goods is given in the following table followed by their prices:

Quantities				
Item	2000	2001	2002	2003
Strawberries	8	9	9	10
Ice cream	10	14	18	20
Sushi	12	12	12	15
Coolers	-	-	2	8
Prices				
Item	2000	2001	2002	2003
Strawberries	$4	$5	$5	$6
Ice cream	$2	$2	$3	$5
Sushi	$3	$3	$4	$5
Coolers	-	-	$8	$4

Using these data, answer the following questions:

a) Step 1: Take 2000 as the base year, and take consumption in 2000 as the basket for constructing the CPI. Calculate the cost of the consumption basket for years 2000 through 2003.

Step 2: Calculate the CPI for each year.

Step 3: Calculate the rate of inflation based on the CPI for all years (i.e. between

2000 and 2001, 2001 and 2002, 2002 and 2003).

b) Step 1: Compute the nominal GDP for each year.

Step 2: Compute the real GDP for each year using 2000 prices. For coolers, take the price in 2002 as its base year price.

Step 3: Compute GDP deflators for all years.

Step 4: Calculate the rate of inflation based on the GDP deflator for all years.

c) Compare the inflation rates you've calculated based on the CPI and the GDP deflator. How do you explain the differences? Hint: the availability of coolers improves the quality of ice cream. In this example, can you detect other reasons as to why the CPI overstates inflation?

d) The following table gives the aggregate nominal income of middle class citizens in this economy. In which year did they have the highest well-being?

2000	2001	2002	2003
$110	$115	$145	$190

3. **Using the CPI**

   a)   Find a particular price or wage from the past, from at least 10 years ago and no more than 50 years ago. It may be easiest to ask one of your parents for this, or someone else you know who is old enough to remember what they paid for something, or were paid, in the past. For example, ask what their wage or salary was in their first job, or what they paid in their youth for a beer, a pizza, or a house. Be sure to get the year of this transaction. (This will be easiest if you can get the price or wage from the United States. If that is not possible, try to get some idea of what the price would have been, at the time, in U.S. dollars.)

   b)   Calculate what this price or wage would be today if it had risen at the same rate as U.S. consumer prices. For this you will need to look up the CPI by going to a Bureau of Labor Statistics publication, presumably on the web (see http://146.142.4.24/cgi-bin/surveymost?bls). Report exactly what version of the CPI you use and how you calculate your answer.

4. Nominal and Real Rates of Interest.

Imagine an economy in which only one good – Tasty Ice Cream – is produced and consumed. Each 1/2 gallon carton of ice cream costs $5. Your last job paid you $200. Now you want to reap the benefits of your hard labor.

You have two options: you can either indulge in ice cream right away, and because you are an ice cream fanatic you can't stop before you've used up all your money. Or you can just hold off with the purchases for one more year and receive 12% interest on your bank deposits in the meantime.

    a) The nominal return on your saving in this example is 12%: you get 12% more money back than what you deposited originally. How many extra dollars will you have available to spend after one year? Also, calculate the number of extra cartons of ice cream you will be able to buy if the price remains constant at $5 per carton. What is the percentage increase in the number of gallons of ice cream you are able to consume (real rate of return)?

Now suppose that global warming increases the cost of refrigeration, so over the course of the year Tasty Ice Cream becomes more expensive: The price per carton rises to a whopping $5.60.

    b) Now what is your nominal return from saving your money for one year rather than consuming it right away? How many extra gallons of ice cream do you get to purchase after one year of waiting? What, in this case, is the percentage increase in the number of gallons of ice cream you will be able to consume?

The above calculations show that the real rate of return (r) on your savings (i.e. the real rate of interest) is just the nominal rate (i) adjusted for changes in price (i.e. inflation, π).

    c) Use your calculations to verify the following approximation of the real rate of interest: $r \approx i - \pi$. This equation is called the Fisher equation. (Caveat: this approximation works only when both the inflation rate and the nominal interest rate are small.)

    d) Which interest rate – nominal or real – matters for your decision whether to consume today or tomorrow? Give a brief explanation. In your own case, would you rather consume now or wait?