MA 111 — Worksheet 2.2

1. Given below is a table of values of the Consumer Price Index in December of the stated years. Find the missing values in the table. (These values give the *inflation rate*.)

Year	CPI	% change from previous year
2009	215.949	
2008	210.228	
2007	210.036	
2006	201.8	
2005	196.8	—

2. Using the CPI values above, find the missing values in the table.

Year	Value of 2009 dollar in given year	Value of 1 dollar in 2009 dollars
2009	$1.00	$1.00
2008		
2007		
2006		
2005		

3. From the UK tuition article we looked at earlier this semester, we have the following (in-state) tuition costs:

Years	Tuition	Tuition in 2009 dollars	Real % change from previous year
'09-'10	$8122		
'08-'09	$7736		
'07-'08	$7096		
'06-'07	$6510		—

4. (a) What was the average of the real percent increases in the previous table?

    (b) Using this average rate of real increase, project the tuition rates for the following years:

Year	Tuition in 2009 dollars
'10-'11	
'11-'12	
'29-'30	
'34-'35	

5. According to the Census Bureau (http://www.census.gov/hhes/www/income/histinc/h08a.html), the median income in Kentucky (in 2006 dollars) was $38,694.

    (a) What is the median income in 2009 dollars? (The average CPI for 2006 was 201.6, and the average CPI for 2009 was 214.537.)

    (b) For the '09-'10 school year, in-state tuition represents what percent of the median income for a Kentuckian?

    (c) For the '34-'35 school year, in-state tuition represents what percent of the median income for a Kentuckian?

<div align="center">**Additional Notes**</div>

- **Dollars <u>are not</u> a valid unit of measure.**

  This is essential to understanding what we are learning right now.

- **Dollars during a specific timeframe <u>are</u> a valid unit of measure.**

  The value of a dollar in 1980 (also called simply a "1980 dollar") can have its value assessed.

  We assess the value of money based on its *purchasing power*, that is, how much stuff it can buy. This makes it possible to relate 1980 dollars and 2010 dollars.

- When *inflation* occurs, the purchasing power of money goes down — it takes more dollars to buy the same item. The general tendency of the U.S. economy is for inflation, rather than deflation. This means the purchasing power of a dollar is nearly always declining.

- We can assess the amount of inflation using the Consumer Price Index. This index gives us the <u>relative</u> increase or decrease in the purchasing power of money.

  Example. The CPI in December of 2009 was 215.949, and the CPI in December of 1991 was 137.9.

  - The fraction $\frac{215.949}{137.9} = 1.56598\ldots$ shows that \$1 in Dec. 1991 equates to roughly \$1.57 in Dec. 2009.

    It also shows that prices in Dec. 2009 dollars are 56.6% higher than prices in Dec. 1991 dollars.

  - The fraction $\frac{137.9}{215.949} = 0.63857\ldots$ shows that \$1 in Dec. 2009 equates to roughly \$0.64 in Dec. 1991.

    It also shows that prices in Dec. 1991 dollars are 36.1% lower than prices in Dec. 2009 dollars.

- In general, use common sense.

  If the price of an item from 1991 is being adjusted for inflation, putting it in 2009 dollars, the resulting number should be higher than the 1991 price.

  If we were confused and used the conversions the wrong way, the price would go down instead. *This should be an obvious mistake.*

- Also, "follow the units."

  The CPI numbers lead to a conversion factor. Using the example above, the factor is:

$$\frac{\$215.949 \text{ in Dec. } 2009}{\$137.9 \text{ in Dec. } 1991}$$

  Recall: if needed, we flip over the conversion factor, to make sure "old" units cancel and "new" units remain.

  Example. The price of a loaf of bread in December 2009 was $2.59. What would be its price in Dec. 1991 dollars?

$$\$2.59 \text{ in Dec. } 2009 \cdot \frac{\$137.9 \text{ in Dec. } 1991}{\$215.949 \text{ in Dec. } 2009} = \$1.65 \text{ in Dec. } 1991$$

- The price on a price tag, at the time of sale, is a *nominal* price. The price, adjusted for inflation to allow for comparison with other items and in other years, is the *real* price.

  We can also speak about the *real* relative change in the cost of an item, that is, the relative change in the price that would have occurred if inflation had been absent.

  Example. As seen on the worksheet in class, the real relative change in UK tuition has been an increase. However, if one were to consider the cost of a 4 GB USB jump drive, the price has shown a real decrease over time.

  Note: It is also possible that the nominal price of an item is increasing at the same time as the real price of the item is decreasing.