Fortran and Python Exercise 3

Download the file CPI.csv from Resources/Data/FP_HW. This file contains the annual Consumer Price Index for all years for which it is available, which I laboriously compiled by running the online calculator at the Bureau of Labor Statistics 100 times. The actual baseline is 1980 but I set my baseline at the beginning of the data, in the year 1913.

Write a program that will read from the command line the name of a file and an integer year. Give it the CPI.csv file and your birth year (or for the paranoid, some other year of significance to you that is more than a decade in the past). Read this file into your program. Do not assume you know in advance how many lines it contains.

Python: Check that you have enough command line input and exit if you do not. Use try/except to check that the input data are valid and exit if either is invalid. Note that you can add a message to sys.exit(), e.g. sys.exit("Invalid data")

Fortran: Like Python, check that you have enough command line input. You are more limited in exception handling but stop if you don't have enough command line input. Use the inquire statement to check that the file requested by the user exists before you attempt to open it. Similar to Python you can add a message to stop, e.g. stop "Invalid data"

The ratio of any two years is an estimate of the change in the cost of living. Compute the change in the cost of living from the year you specify to 2012. Print it out neatly with some informative text. Do not print more than 2 decimal places since this is all the data contain.

In 1954 a color television cost $1295. Compute and print an estimate of the cost of the television in 2012 dollars.

The derivative of the CPI will give us an estimate of the inflation rate. (Our economist will probably object but we will ignore him.) The CPI data I have provided is annual so let us use the formula

$$I = \frac{CPI(yr+1) - CPI(yr)}{12}$$

Notice that you have one less year of inflation than of CPIs. Compute the inflation array and write it to a file inflation.csv

Plot the CPI and the inflation. Python: use Matplotlib (matplotlib.org) for both. Check out the gallery for pictures of the kinds of plots you can use Matplotlib to produce. For this exercise it is enough to use the simplest plot function. If you call show() between calls to plot you will see one plot after the other (you must dismiss the first for it to go on). Fortran: you can use Excel or anything else to plot the CPI directly from the file, and you will use the CSV file you generated above to plot the inflation rate.