CS 101
Fall 2015
Program Assignment # 5
Algorithm Due : Sunday, Oct. 25, 2015
Program Due : Sunday, Nov. 1, 2015

Weather Station Data

You've been asked to write a program to read daily precipitation from a file and create a new file that has the monthly totals. There are 10 years of data in the precipitation file, with data for each day of the month. Some days there were errors in recording the data and NA has been entered. You should use functions wisely to make your code more modular and testable.

The Input Format

The input file is precipitation.csv. CSV stands for comma separated value. Each column is delimited by a comma. It is a very common format used to export and import data. You can open it easily with Excel to view the rows and columns of data. Many of these will have a row at the top with the names of the columns separated by commas.

There are only 2 columns in this file; the date, and the amount of rainfall in mm. The date information is in YYYYMMDD format. Four characters for the year and 2 for the month and 2 for the day. For example the algorithm is due on 20151025.

precipitation.csv

```
20091006,5.8
20091007,0.0
20091008,16.0
20091014,NA
20091015,3.0
20091016,0.0
```

This excerpt from the file shows 5.9 mm on October 6th, 2009. Notice on the 14th of October 2009 no data was recorded.

The Output Format

You will create a new output file that has each year month precipitation amounts totaled. Since our sample file has data from 20000101 to 20091231, the output file will have a total precipitation for each month from 2000 to 2009. The output file will also be a CSV file with 2 columns. A date column and a total precipitation column. The date column won't require the day and will be in the format YYYYMM.

```
200001,9.4
200002,57.2
200003,67.6
200004,9.8
200005,68.7
200006,189.2
200007,149.79999999999998
```

The totals above show that the month of January in 2000 had a total of 9.4 mm of precipitation for the total month.

Month Totals Averaged

The final part of your program will find the averages of total precipitation for each month. You will output the average for the total rainfall in Jan, Feb, etc.

Requirements

- Ask the user for the precipitation file to read. If the file does not exist, show the error to the user and ask them to choose a new file.
- Ask the user for the file to output to. If the file cannot be opened in write mode for any reason then warn the user and them to choose another file. One reason you may not be able to write to a file is if you give the name of a directory.
- Any row from the input file that has NA or other non float values should be ignored.

Useful Modules and functions

- .split() method is useful for splitting a string by a certain delimiter. In this case a comma.
- The csv module can be used to help read csv files. It will automatically handle spliting the lines by the comma.

Example

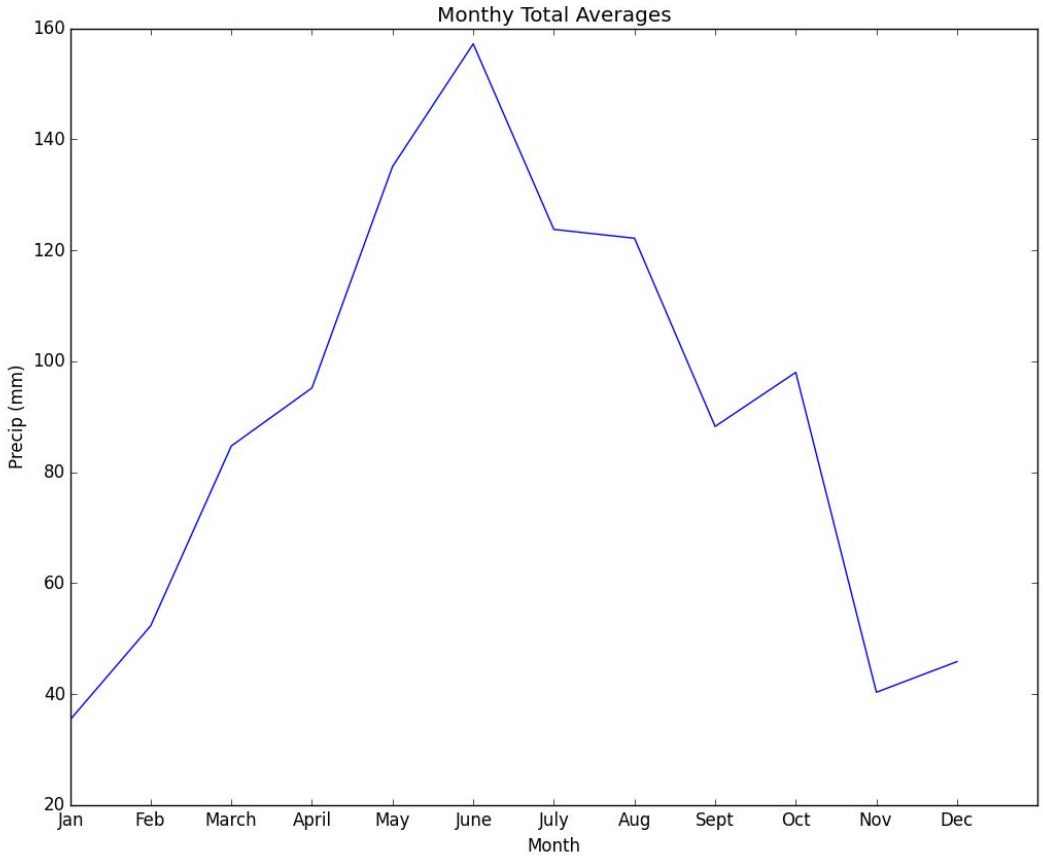
```
>>> ================================ RESTART ================================
>>>
Enter the file with precipitation data ==> notfound.csv
The file specified could not be found
Enter the file with precipitation data ==> precipitation.csv
Enter the monthly data file to save to. ==> test
The file specified had an IO Error
Enter the monthly data file to save to. ==> precip_monthly.csv
```

```
      Monthly Total Averages

    Month          Avg Precip
    =====          ==========
      Jan             35.3500
      Feb             52.3100
    March             84.7300
    April             95.1900
      May            135.1300
     June            157.2400
     July            123.7800
      Aug            122.1900
     Sept             88.2500
      Oct             98.0000
      Nov             40.3200
      Dec             45.8444
>>>
```

Extra Credit (5 Points)

The pylab module is used to plot data. Add a section of your program to graph the average data. You will want to look at the .plot(), .show(), .xlabel(), .ylabel(), .xticks(), and .title() methods. Pylab is installed on the lab computers in Flarsheim Hall.



References

- http://www.ncdc.noaa.gov/ - Weather data from independence.