

Engineering Models II: Homework #2

You will be working with a dataset of daily weather statistics taken over the last twenty years at the CVG (Cincinnati) Airport. This is the same dataset that you worked with for Lab 2. The source of the weather data is the National Oceanic and Atmospheric Administration:

<http://www.ncdc.noaa.gov/data-access/land-based-station-data/land-based-datasets/quality-controlled-local-climatological-data-qclcd>

Instructions:

1. If you don't still have a copy of Weather.mat from Lab 2, download the Weather.mat file, and save it in your current MATLAB folder.
2. At the MATLAB command prompt, type the following:

```
>> load Weather
```

You should now see a dataset called CVG (7305x13) in your workspace window. If not, make sure Weather.mat really is in your current MATLAB folder and/or ask for assistance.
3. Double click on the CVG dataset to open it up in the Variable Editor Window. This dataset has thirteen columns defined as follows:
 - CVG.STATION is the station identifier number is exactly the same throughout this dataset since all of the weather data is from CVG airport: 'GHCND:USW00093814'
 - CVG.YEAR, CVG.MONTH, and CVG.DAY designate the year, month, and day data was taken. This dataset begins at January 1st, 1994 and ends on December, 31st, 2013. Note that CVG.MONTH is numeric – not a string.
 - CVG.PRCP is the daily precipitation (in inches)
 - CVG.SNWD is the daily snow depth (in inches)
 - CVG.SNOW is the daily snow fall (in inches)
 - CVG.TMAX is the maximum daily temperature (in °F)
 - CVG.TMIN is the minimum daily temperature (in °F)
 - CVG.AWND is the average wind speed (in mph)
 - CVG.WSF2 is the fastest 2-minute wind speed (in mph)
 - CVG.WSF5 is the fastest 5-second wind speed (in mph)
 - CVG.PGTM is the peak gust time, hours, minutes (HHMM)
4. If you look in the variable editor window at the CVG dataset, you will notice some odd entries of -9999 under WSF2 and WSF5. A value of -9999 indicates an invalid reading. Invalid readings typically occur in large databases like this. An invalid reading indicates that a measurement wasn't properly entered in for that date or time possibly because somebody forgot to enter it in, or a sensor wasn't working that day, or the communication between the sensor and the database broke down. In this case, CVG didn't start measuring WSF2 and WSF5 until October 1, 1995.

Note: There are invalid entries scattered throughout this database in several other columns as well.

Problem 1: Find the day or days with the most rainfall (PRCP). Display the date(s) and the amount of rainfall. Do not scroll through the dataset to answer this question. Do this with MATLAB commands.

MATLAB Commands and Results:

Problem 2: Find the day or days when the snow was deepest (SNWD). Display the date(s) and how deep the snow was. Do not scroll through the dataset to answer this question. Do this with MATLAB commands.

MATLAB Commands and Results:

Problem 3: Compute and plot the total precipitation in July for each year from 1994 thru 2013. Put the total rainfall on the y-axis and the year on the x-axis. Include labels (with units if appropriate) and a title on your plot. **Hint: Use a for loop like in Lab2 Part D.**

MATLAB Commands (or submit a script)

PLOT:

Problem 4: Compute and plot the total snowfall (SNOW) in January for each year from 1994 thru 2013. Put the total snowfall on the y-axis and the year on the x-axis. Include labels (with units if appropriate) and a title on your plot.

MATLAB Commands (or submit a script)

PLOT:

Problem 5: Compute and plot the total snowfall (SNOW) in March for each year from 1994 thru 2013. Put the total snowfall on the y-axis and the year on the x-axis. Include labels (with units if appropriate) and a title on your plot. **Beware of invalid (-9999) readings. Don't include this day or day(s) in your calculation of total snowfall.**

MATLAB Commands (or submit a script)

PLOT:

Problem 6: Find the rainiest month in the last twenty years. Display the month, year, and the total rainfall for that month. **Hint: Use a nested for loop to loop thru both months and years.**

MATLAB Commands (or submit a script) and Results