**CVG Airport Weather Statistics**

You will be working with a dataset of daily weather statistics taken over the last twenty years at the CVG (Cincinnati) Airport. 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>

**Part A: Introduction to the CVG Dataset**

1. 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.

1. 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 oF)
* CVG.TMIN is the minimum daily temperature (in oF)
* 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)

1. 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.

**Part B: Simple Data Analysis on CVG dataset array**

In this part of the lab, you will be answering a series of questions about the CVG dataset. Include both your answers to the questions and the MATLAB commands used to answer the questions. **Make sure you include units in all of your answers.**

1. Enter your Birthday: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*(If you were born before January, 1, 1994 use the month/day of birth but change year to 1994)*

Use the find command to find the row in the dataset corresponding to your birthday as follows:

>> BD\_Row = find(CVG.YEAR == *YourYear* & CVG.MONTH == *YourMonth* & CVG.DAY == *YourDay*)

Now find the weather stats for your birthday as follows:

>> CVG(BD\_Row,2:10)

PASTE RESULTS HERE:

2. What was the highest maximum temperature recorded at CVG in the last twenty years?

Highest Max Temp:

MATLAB Command(s):

3. On what date(s) was the highest maximum temperature recorded at CVG?

Date(s) of Highest Max Temp:

MATLAB Command(s):

4. Fill in the following table. Paste MATLAB commands below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Month** | **Month**  **Number** | **Year** | **Mean of**  **PRCP (in)** | **Standard Deviation of PRCP (in)** | **Total Precipitation for Month (in)** |
| **April** | **4** | **2013** |  |  |  |
| **May** | **5** | **2013** |  |  |  |
| **June** | **6** | **2013** |  |  |  |

MATLAB Commands (JUST FOR ONE OF THE MONTHS):

5. Which month ***in your table*** had the most variability in daily rainfall?

Month with most variability:

**Part C: Adding Columns to the CVG dataset array**

1. The wind chill factor (WCF) describes how cold it “feels” for a given temperature T, in Fahrenheit, and a given wind speed V (in miles per hour). The equation for wind chill factor, in Fahrenheit, is:



Create a new column in your dataset array for wind chill factor. Use TMIN for T and

AWND for wind speed, V.

MATLAB Command(s) to create column:

1. How many days in the last twenty years was the wind chill factor below 0 oF?

Number of Days with Wind Chill below 0o F:

MATLAB Command:

1. What percent of days in the last twenty years had a wind chill factor below 0 oF?

Percent of Days with Wind Chill below 0o F:

MATLAB Command:

1. Based on the following table, create another new column in your dataset array that provides a one-word (string) description of the weather based on the average wind speed (AWND).

*Note: you probably want to do this in a script file since it involves a loop.*

|  |  |
| --- | --- |
| **AWND** | **Description** |
| Below 3 m.p.h | Light |
| 3 m.p.h. < WindSpeed < 12 m.p.h. | Gentle |
| 12 m.p.h. < WindSpeed | Breezy |

Open up CVG in the Variable Editor Window and check a couple of rows to see if your commands produced the expected results.

MATLAB Commands (paste commands from script file here):

1. How many days in March of 1998 were “Breezy”?

Number of “Breezy” Days in March 1998:

MATLAB Command:

**Part D: Generating and Plotting Data from the CVG Dataset**

1. Write a script file that will compute the **average** (**mean**) of the temperatures, TMAX, in July for each year from 1994 thru 2013. The script should then produce a plot with the average July temperature on the y-axis and the year on the x-axis.

PASTE PLOT HERE:

PASTE Commands from Script File HERE:

1. Take a look at the plot. Does a linear (line) curve fit look reasonable for this data? Why or why not?