1.017/1.010 Recitation 1
Programming in MATLAB

Downloading and editing data

Accessing Internet and MATLAB on your lap-top and on ATHENA

Downloading a simple data set from the web to a text file in the `mit_1017` directory on your laptop.

Data at http://www.co2science.org/ushcn/ma/ma.htm

Use data from Blue Hills, MA, average yearly temperature and precipitation.

Save as `bh_temp.txt` and `bh_precip.txt in MIT_1017` directory

Edit the data set with the MATLAB editor (see MATLAB help)

Load data from a text file into MATLAB, the `load` command:

```
load bh_temp.txt
load bh_precip.txt
```

MATLAB variables

Variables/arrays -- scalars, lists/vectors (1 dim), tables/matrices (2 dim)
Accessing elements of arrays:

```
bh_temp(i,j), bh_temp(:,j), bh_temp(i,end),
bh_temp(1:3,j), etc.
```

```
size command
```

Assignment Statements

Using the equal sign to define/modify variables
Example:
```
temp=bh_temp(:,2)
precip=bh_precip(:,2)
year=bh_temp(:,1)
```

Plotting Data

Plotting array elements using `plot`

Some plotting guidelines:

- open a separate window for each plot with the `figure` command
- If you run a program many times it is advisable to precede your first plot command by the command `close all`. This closes figure windows generated previously.
- Plot titles, axis labels and legends can be added using MATLAB functions or **interactively** by using pulldown menus in plot window.
- See documentation of `hold` function re. plotting **multiple curves** on one set of axes
- See documentation of `subplot` function re. arranging **several plots** in a single window

Time series plot (e.g. temperature vs. time)
Scatter plot (e.g. precipitation vs. temperature)

MATLAB scripts

Interactive calculations in command window vs. collection/**batch** of commands stored in a file (a program). Batch can be saved, modified, called in command window

MATLAB scripts, .m files

Exercise: Displaying data in MATLAB:

1. Go back to climate data: http://www.co2science.org/ushcn/ushcn.htm and download temperature and precipitation data from any available US location.
2. Edit the data file so that it can be loaded into MATLAB. Keep only the years that are common to both sets of data.
3. Create a new file and name it. You can now run `filename.m` by typing `filename` in the command window.
4. In the new program, load the data and name it.
5. Plot Temperature vs. Time and Precipitation vs. Time on the same axis. Create a legend
6. In a new figure window, plot Temperature vs. Time and Precipitation vs. Time on two separate axes.
7. In a new figure window, plot Temperature vs. Precipitation as a scatter plot.
8. Title and label all plots

9. Create comments using a '%' at the beginning of a line. MATLAB will then ignore the line. This is important when saving a file and going back to it later so you (or someone else) can easily understand what each set of commands is doing.

Relevant MATLAB functions: `load, figure, plot, close all, xlabel, ylabel, title, subplot, axis, axes`

Download example program climate_plot.m

MIT   *Copyright 2003 Massachusetts Institute of Technology*
      Last modified Oct. 8, 2003