

AMATH 410
MATLAB TECHNIQUES

This is a PARTIAL list. In addition, please make sure that you're familiar with the MATLAB functions and techniques that are listed in the sections of the Lab Manual that we have covered so far, and the command used or mentioned in class (codes will be posted online with class notes).

*** Week 1 ***

- Commands and topics discussed in LAB manual sections 1-5, and all exercises in those sections. Specifically and/or in addition:
- Use `help functionname`, where `functionname` is anything you don't know how to use yet (say, `help hist`), whenever you want more info. `doc functionname` often gives even more info, with examples – cutting and pasting these to the command line is a great way to get started.
- `whos` command – type this at command line to see list of all variables and their sizes
- Or, to see values of a variable, either go to “workspace window,” as described in Lab Manual, or simply type its name at the command line. e.g., type `>> A` to see value of `A`
- Changing the working directory in MATLAB. At the top of the matlab command window, it'll say what directory you are currently working in. Of course, this needs to be the same one where you are saving your `.m` program files and any data files to. To change the working directory, either click on the “bar” where this is displayed, or use the `cd` command at the command line.
- Editing `.m` program files: just type `edit programfile` and an editor will pop up.
- Loading data using `load`
- Commands `size` and `length`
- Command `linspace`
- Using the colon to extract parts of vectors or matrices

*** Week 2 ***

- Commands and topics discussed in LAB manual sections 6-9, and all exercises in those sections. Commands in all codes discussed in class and posted in website. Specifically and/or in addition:
- Using `for` loops
- Using the `disp` and `num2str` commands to output data to screen in organized way – see p.15 of Lab Manual
- Using and writing MATLAB functions
- Use of anonymous functions and function handles
- Use of the `hold on` command for plotting multiple curves (or points, etc) in a single plot.
 - Syntax: `figure ; plot(xlist1,ylist1) ; hold on ; plot(xlist2, ylist2)`
 - Please compare this with what happens when you leave off the `hold on`

- Use of the percent sign, %, to start a comment (notation that is ignored by MATLAB)
- Use of the ‘vectorized’ operations .+, .*, .^, etc., to do ELEMENT-WISE operations on entries of vectors or matrices. Please note that, for example, the .* command is therefore very much different from the matrix multiplication operation of linear algebra.

*** Week 3 ***

- Commands and topics discussed in LAB manual section 8, and all exercises in those sections. Commands in all codes discussed in class and posted in website. Specifically and/or in addition:
- Using `format` control to specify numbers of signif. digits (etc.)
- Using eigenvalue / eigenvector commands via `eig`
- Use of `find` command to identify, extract, or modify target entries in a matrix or vector (e.g, sec. 8 of lab manual)
- Using `max` and `abs` – e.g. to find dominant eigenvalues / eigenvectors (sec. 8 of lab manual)
- Matrix multiplication via `*` and `^`
- Linear solve of matrix equations $W*c = n$, where W is matrix, n is *given* vector, and c unknown vector that are solving for. Syntax: `c=A\n`

*** Week 4 ***

- Commands in all codes discussed in class and posted in website. Specifically and/or in addition:
- Using `rand` and `randn` random number generators
- Using the `mean` and `var` commands
- Plotting and properly scaling a histogram
- Simulating a Markov chain – using logical operators and repeated calls to `rand`