

EECS 360 Signal and System Analysis

Lab 1. Introduction to Matlab

1. Basic Matlab functions and algebra operations:

2-D & 3D Drawing function	Operator	transform, conversion
plot, bar, stem, mesh, polar	+, -, *, /, ^, sqrt, . (), []	' , fliplr, imag, real,

Practice: type in *help command* and see what Matlab tells you.

Tip: Best book to learn Matlab is the Matlab help.

2. Different ways of running Matlab commands

- Command line: works great for simple commands and functions
- .m file: M-file is a Matlab executable file which store a group of functions and commands. It is useful when complicated computation is required. It's the most commonly used method when dealing with Matlab coding.
- .mat file: mat file is normally used to store data for later use. The file with .mat extension can be called by command lines, m-files within the same directory.

Practice: Calculate the following functions

(a). $(5 + 4j) * (4 - 5j)$

Tip: i , and j , are recognized as $\sqrt{-1}$ in Matlab by default.

(b). $\sqrt{20 * \frac{24}{7} - 12^4} + e^{1.32}$

Tip: exponential function is expressed as $exp()$ in Matlab.

(c). $\cos(\pi) + \sin(\pi)$

Tip: Use pi in Matlab to represent π .

(d). Vector and Matrix calculations

To define a vector or a matrix: `[]`

Example: `t = [1,2,3,4]; x = [1,2,3,4; 5,6,7,8];`

Tip: semi-column operator in the end of a command prevents Matlab from outputting the results.

Try `t = [1,2,3,4]` and `x = [1,2,3,4; 5,6,7,8]` to see what happens?

Calculate: `t*x`, what happens if you do so? Now try `t'*x`. what does the single quote ' do?

(e). $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}$

calculate: $A+B$, $A-B$, $A*B$, $A.*B$. What is the different output difference between $A*B$ and $A.*B$? what does operator dot do?

(f). create an .m file in Matlab, and copy the following code into your *.m file:

```
% Clear history and memory before the code is executed
clear all, clc

% Define vector x function y and z
x = [-pi:pi/8:pi];
y = sin(x);
z = cos(x);

% subplot 1
subplot(221)
plot(y);           % plot y only.

% subplot 2
subplot(222)
plot(x,y), hold on; % plot y versus x, and hold
plot(x,z,'r--'), hold off; % plot z versus x with
legend('y','z')

% subplot 3
subplot(223)
stem(x,y);        % plot y versus x in discrete sequence
title('Y stem plot') % add title to the plot

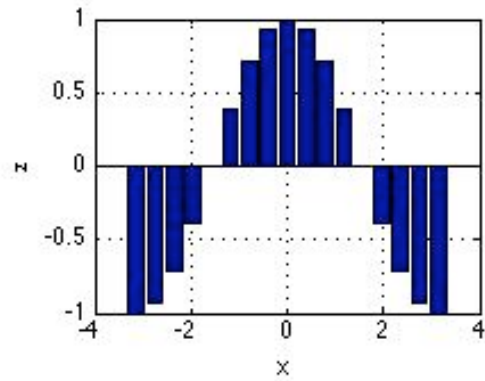
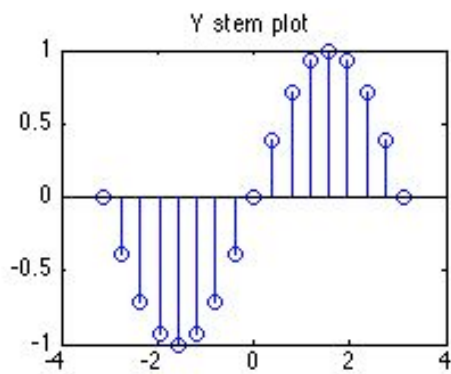
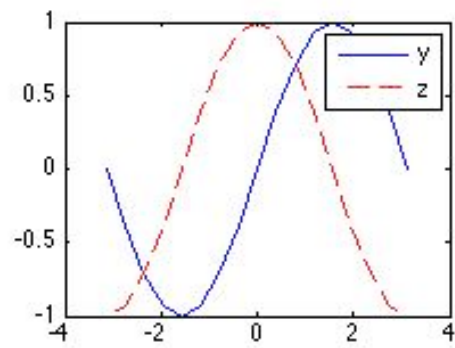
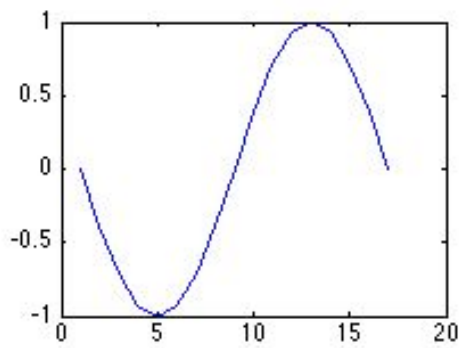
% subplot 4
subplot(224), bar(x,z); % plot z versus x using bar chart
xlabel('x'), ylabel('z'); % add labels to the figure
grid on; % add grids to the figure
```

save your m-file on your home directory, and run it. (F5 key)

Tip: % is used to comment out a certain command line or block.

Practice: try to comment out the last line: grid on by adding the % sign in front of the command: % grid on;

Your figure should look like:



3. A very useful command: `lookfor <keyword>`
4. Play around with Matlab functions and features, it's fun.