5 MATLAB

Objective

This lab will introduce the MATLAB scripting language and interactive environment. MATLAB is a programming tool commonly used for computational mathematics with an emphasis on matrix manipulation. MATLAB is a very large tool, this lab will only introduce the basics to getting started with the MATLAB IDE (integrated development environment).

Theory

The MATLAB IDE is an integrated development environment that enables running MATLAB code in two manners: interactively or by scripting. The interactive environment allows a user to quickly input variables, perform manipulations, and display results. MATLAB scripts are used to save a series of MATLAB commands to a file to be run multiple times. MATLAB scripts are simply lists of MATLAB commands that are run consecutively at runtime.

Variables can be created by providing a variable name followed by the equals sign and a value assignment. For example: var = 12; . Where "var" is the variable name, and 12 is the value assigned to it.

MATLAB can be accessed by running the IDE directly on the lab computers. You can also use the interactive web client from any browser with your school account. You can find the web client at `https://matlab.mathworks.com/`

If you are interested in learning more, visit TutorialsPoint: `https://www.tutorialspoint.com/matlab/matlab_quick_guide.htm`. MATLAB also has a rich set of manuals which can be accessed online or directly in the IDE.

Equipment

- Lab Computer
- MATLAB software

Procedure

5.1 Interactive MATLAB

Use the interactive portion of the MATLAB IDE to perform the following commands.

1. a = 5
2. b = 10
3. a + b
4. x = a + b;
5. x
6. m = [1, 2, 3, 4, 5];
7. y = a .* m % **Record the result y**

8. y2 = a .^m;
9. plot(y2) % **Save a screenshot of the plot of y2**

We can generate vectors using common functions such as a sine wave.

1. x = -pi:0.1:pi;
2. f = 2 ;
3. s = sin(f .* x);
4. clf
5. hold on
6. plot(x, s)
7. plot(x, sin(x))
8. hold off

5.2 Scripted MATLAB

MATLAB scripts are used to run repeatable MATLAB code and allows the use to save their work.

Write a script that adds the sum of two sine waves with different frequencies. Define the frequencies as two variables: f1, and f2. Plot the resultant sum.

Record the script and a screenshot of the plot in the lab report.

Questions

1. In interactive MATLAB, what command is used to clear the workspace? What command is used to clear the figure?
2. Consider the following: $z = 0 : 1 : 10$; What is the size of the z vector? What do each of the fields represent (field1 = 0, field2 = 1, field3 = 10)?
3. What is the function of the semicolon (;) at the end of a line?
4. Describe how to plot two or more series on one figure?
5. Record the script and resultant plot from Section 5.2 below.