Jaylen Knight  
CSCI-3327-001  
Octave Tutorial

Octave is an open-source alternative to the proprietary language MATLAB. Octave is language that primarily deals with solving and array of mathematical problems like linear and nonlinear equations, finding roots of said equations and integrating functions to name a few whiles also supporting graphing on 2 dimensional and 3 dimensional planes. While Octave used to operate using input from the command line only, more recently it now also supports a window interface similar to most IDE’s for executing code from, though both ways will still produce the same end result.

Octave’s programming language is very similar to simply writing out what you want the program to perform barring some syntax rules. For example, simply putting in “5 + 5” is enough for the language to comprehend and print out 10 in the workspace area. The [Octave wiki](https://wiki.octave.org/Using_Octave) was a great starting point for learning how to use the language as it briefly goes over each of octaves major functions on a more surface level while also including a link that takes you to a much more in depth version of its documentation present within octaves manual. Like mentioned above the “5 + 5” is an example of Octaves “Command evaluation” and “elementary math sections however upon going through the link present it takes you to the manual which covers those sections and the manual even encourages you to use their examples to get a feel for how the language operates. My main purpose for using Octave was to learn specifically about its plotting capabilities which leads me to the plotting section of the wiki.

[This](https://docs.octave.org/interpreter/Two_002dDimensional-Plots.html) is the in-depth look at Octaves plotting functionality and capabilities specifically focusing on 2d plotting. The plot function defined by “plot(arguments)” and the arguments can be a variety of inputs controlling what your plotting, what color will your plot be, the type of line your plot will create, and more. The most common invocation of this would be plot(x,y); x being the domain of your plot and y being the actual function you are plotting. Syntax for defining the x value or domain of your function is as follows, “x = 0:0.1:10;” would translate as x starting at 0 and adding 0.1 for each iteration until x is greater than or equal to 10. For clarity and code readabilities sake x and y should be defined prior to invoking plot rather than replacing x and y with what they’re supposed to be but it’s still possible regardless. Plot can as mentioned previously have more arguments present inside the method, One being the color of what you’re plotting.

Color for the plot function and Octave in general can be specified in one of three ways, RGB triplet for example [.5, .2, .2] which translates to a color that is fifty percent red, twenty percent green, and twenty percent blue, by name in which octave supports natively has 8 different colors to choose from where you can either type out a single letter or the entire color. These colors are k for black, r for red, g for green, b for blue, y for yellow, m for magenta, c for cyan, and w for white. Lastly Octave accepts HTML notation or hexadecimal for colors IE #ff0000 produces a pure red. Other components of creating a graph include defining a title, x and y axis labels, and a legend explaining what each line present represents. This is all easily defined by adding lines below the plot method by virtually calling the name of what you wish to be defined, for example title(“String”); will add a title to your graph that is whatever you input as the string, Likewise, defining xlabel and ylabel accomplishes the same result in defining what you want your labels to be.

There are many many more functions and utilities to octave and I have barely begun to scratch the surface of its functionality however this was the baseline knowledge I needed to know in order to complete what I was set out to do. Octave is a supremely useful tool and I plan on utilizing it for any mathematical visualization I do in the future,