

Plotting Demo for Matlab

Here is an entry into plotting functions in Matlab.

It's often helpful to clear out the memory to start fresh. You don't "need" to do this, but it can be helpful, especially if your code isn't working.

```
clear all; % CLEAR all of the variables stored
close all; % CLOSE any open figures
clc; % CLEAR the command window
```

Example 1:

We can plot $f(x) = \sin(x)$ from $x = 0$ to $x = 4\pi$ as follows.

First, define a vector of x values over which we want to evaluate the function $f(x)=\sin(x)$.

Here are the two most common ways of doing that

This defines a vector starting at 0 and going up to 4π with 200 points in it using the "linspace" command (uses a linear spacing of the points).

```
xlin = linspace(0,4*pi,200);
```

Or, we could build our vector directly using

```
xvec = 0:0.01:4*pi;
```

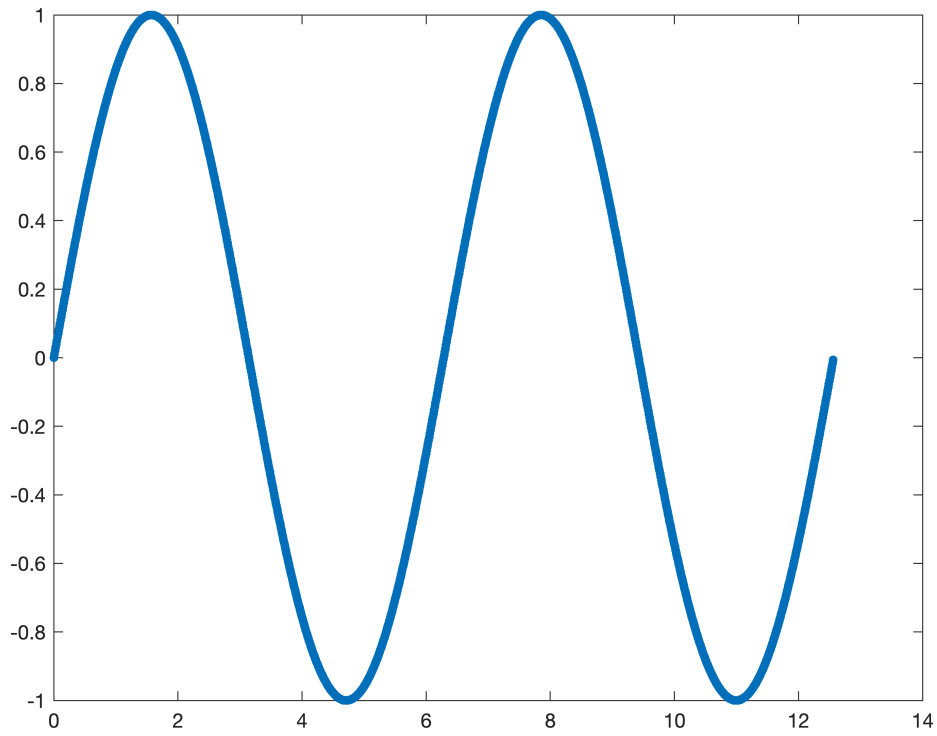
which lets us choose our discretization size (each point is located 0.01 away from the next).

Next, we evaluate our function

```
flin = sin(xlin);
fvec = sin(xvec);
```

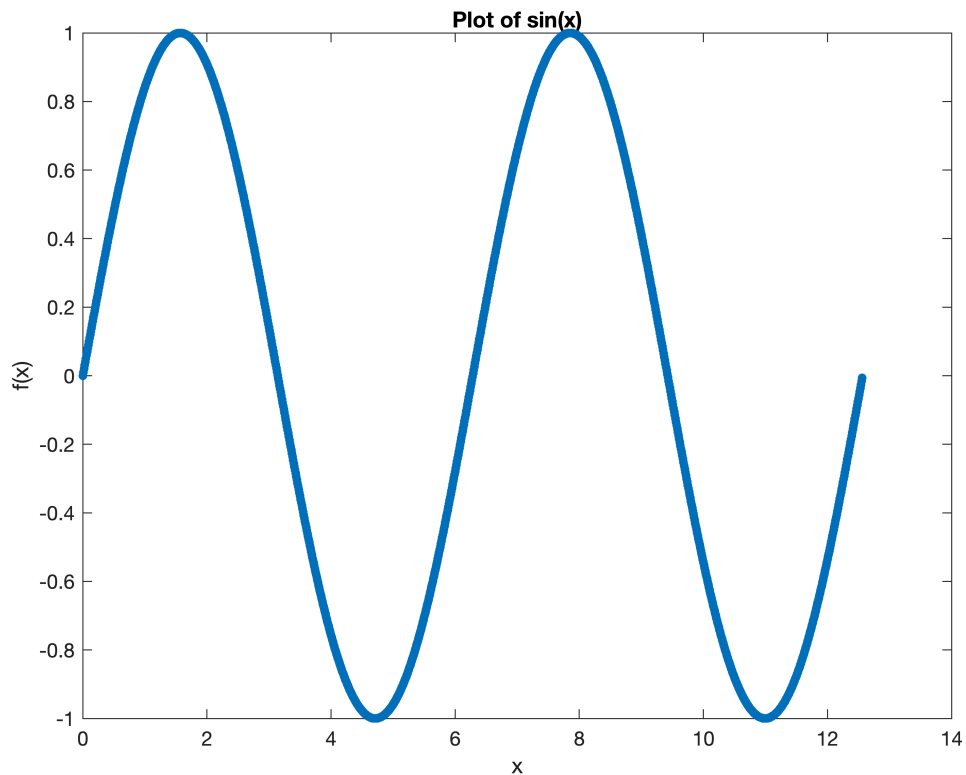
Then, we can plot our function using the "plot" command. We specify the x coordinates and the corresponding function values and then we can choose how we'd like to display the plot. Since we only evaluated it at points, we shouldn't connect the lines between the points. Using the '.' tells Matlab to plot POINTS. The 'markersize', 15 bit tells Matlab to give the dots a size of 15 (feel free to adjust this to make them bigger or smaller).

```
figure;
plot(xvec,fvec, '.', 'markersize', 15)
```



You can add a title to the figure too and add x and y labels

```
title('Plot of sin(x)');  
xlabel('x')  
ylabel('f(x)')
```

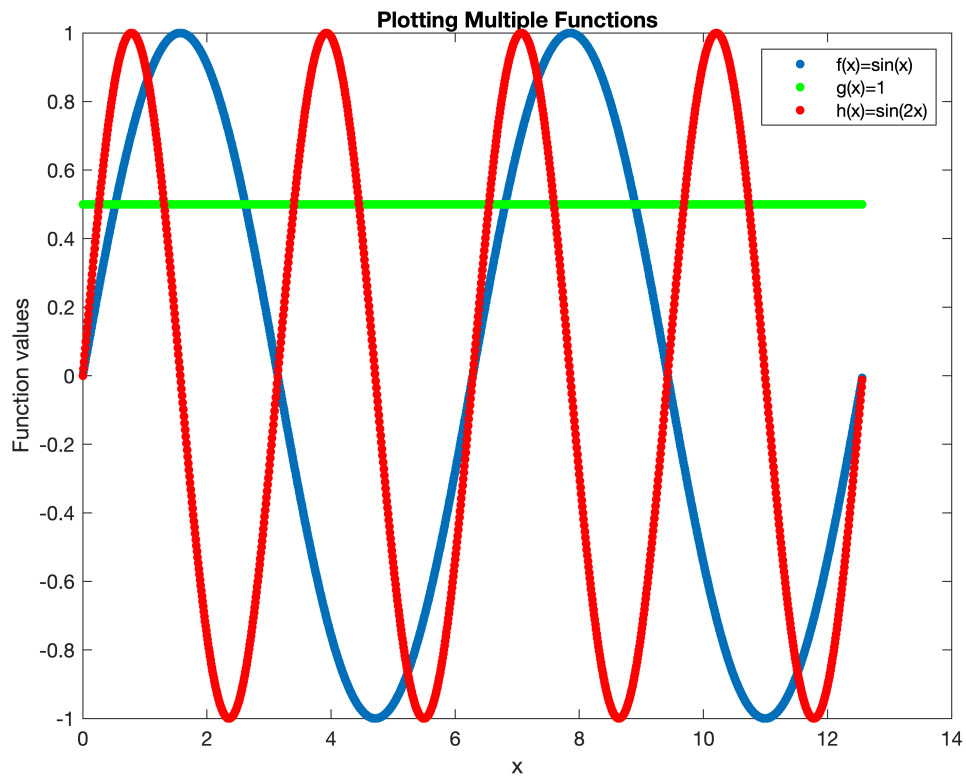


If we want to plot multiple functions on the same figure, it's helpful to name the figure, (say figure(2)) and then use the "hold on" command. Let's add a plot of the function 1/2 as well as the function sin(2x).

```
g = 0.5*ones(size(xvec));
h = sin(2*xvec);
```

The ones command creates a matrix of ones of the specified size. A shortcut is to use the "size" command to make it the size of another object that you want to use.

```
figure(2);
plot(xvec,fvec, '.', 'MarkerSize',15); % the default color is blue
hold on;
plot(xvec,g, '.g', 'MarkerSize',15); % use green dots instead
plot(xvec,h, '.r', 'MarkerSize',15); % use red dots instead
title('Plotting Multiple Functions');
xlabel('x')
ylabel('Function values')
legend('f(x)=sin(x)', 'g(x)=1', 'h(x)=sin(2x)')
```



The nice thing about using "LiveScript" is that you can write text, write mathematics, write matlab code, and see the output all in one document. You can then either print your worksheet out (after saving it of course because it's so exciting), or print it to a PDF (easy uploading for D2L).