MATLAB WEEK 2 ASSIGNMENT

Name : Aryan Pandit
Roll Number : 23BEC023

INTRODUCTION TO PLOTTING IN MATLAB

plot() Function

The plot() function is used for plotting graphs in MATLAB. The values of the x and y axes are passed in the function to obtain the graph.

```
x = -2*pi : 0.01 : 2*pi
y = sin(x)
plot(x , y)
```

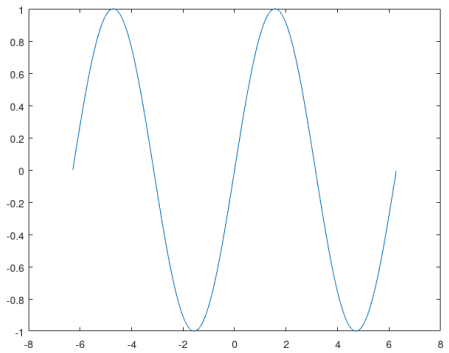


Fig 1

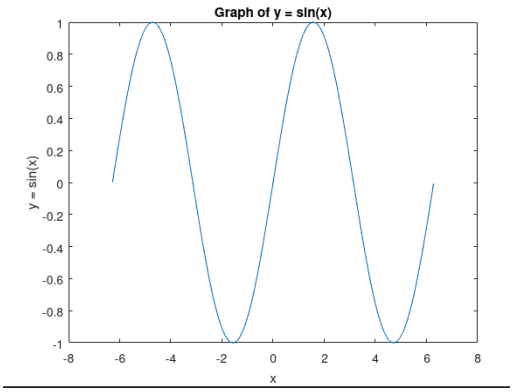


Fig 2

title(), xlabel() and ylabel()

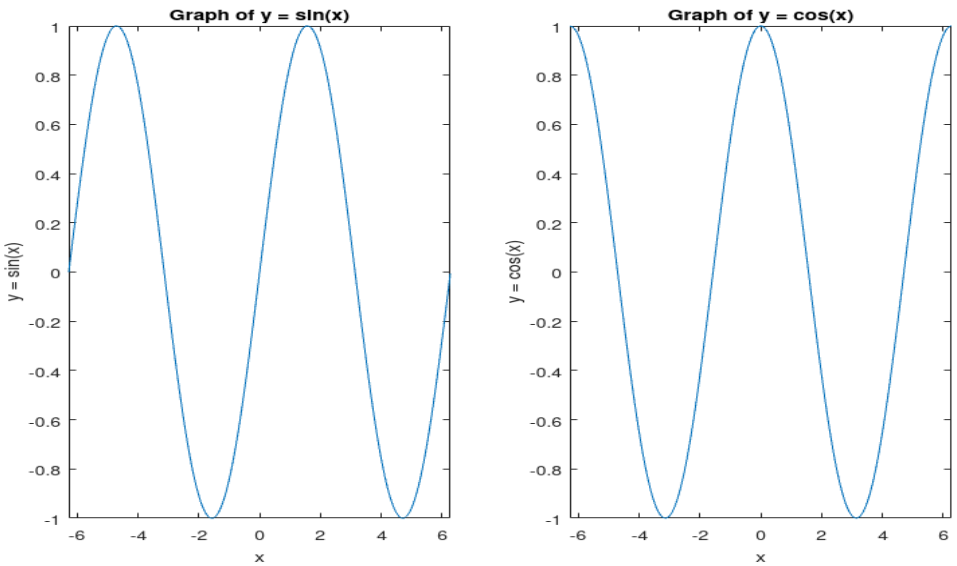
Although the above graph (Fig. 1) shows the features of the curve, it does not provide us enough information about what we are plotting. We use the xlabel() and ylabel() functions to label the axes to make the graphs more comprehensive. The title() function is used to give a title to the graph. Fig 2 represents the labelled graph.

```
xlabel('x')
ylabel('y = sin(x)')
title('Graph of y = sin(x)')
```

subplot()

The subplot() function in MATLAB is used to create a grid of subplots within a single figure window, allowing us to display multiple plots in a single figure. The basic syntax is subplot(m, n, p), where m is the number of rows in the grid, n is the number of columns in the grid and p specifies the position of the subplot in the grid (counting row-wise).

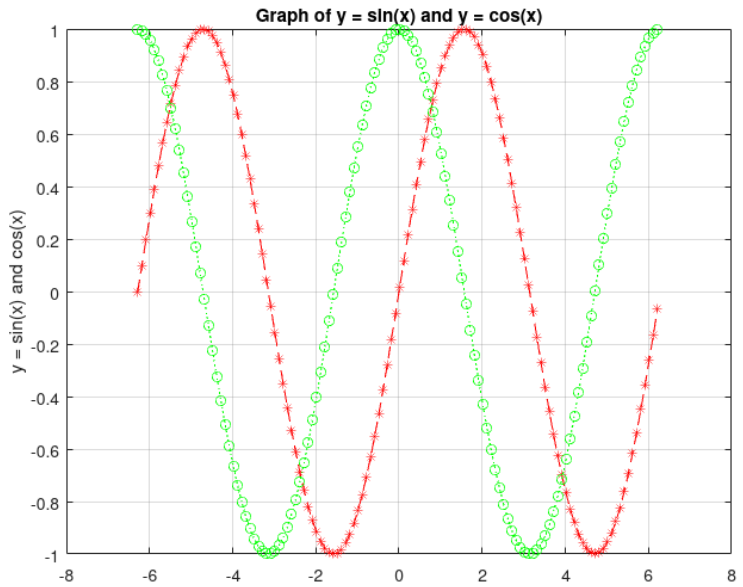
```
clear all
x = -2*pi : 0.01 : 2*pi
y = sin(x)
subplot(1,2,1)
plot(x , y)
xlabel('x')
ylabel('y = sin(x)')
title('Graph of y = sin(x)')

x = -2*pi : 0.01 : 2*pi
y = cos(x)
subplot(1,2,2)
plot(x , y)
xlabel('x')
ylabel('y = cos(x)')
title('Graph of y = cos(x)')
```



‘grid on’ Function, Markers, Colour changes and Plotting Multiple graphs

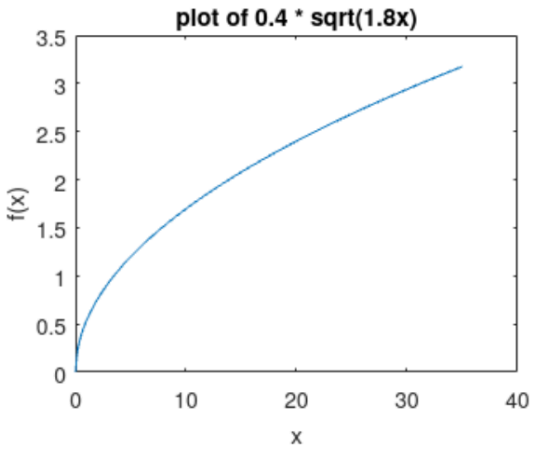
The grid on command adds grid lines to the current plot, while grid off removes them.
Markers: Markers are symbols (e.g., 'o', '*', '+') used in plots to represent data points. They can be customised in terms of shape, size, and colour.
Line Types: Styles like - (solid), -- (dashed), : (dotted), and -. (dash-dot) to differentiate lines.
Colours: MATLAB allows you to specify colours in plots using short colour names ('r' for red, 'g' for green) or RGB triplets for custom colours.
The values of the x and y axes of both the graphs are written in the plot function one after another to obtain multiple graphs in one.

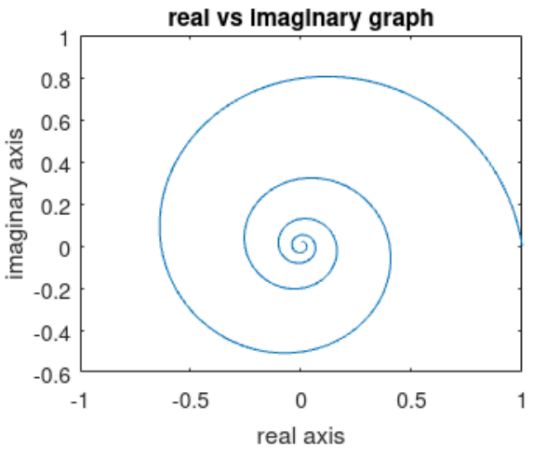
```
clear all
x = -2*pi : 0.1 : 2*pi
y1 = sin(x)
y2 = cos(x)
plot(x , y1,'r--*', x, y2, 'g:o')
grid on
xlabel('x')
ylabel('y = sin(x) and cos(x)')
title('Graph of y = sin(x) and y = cos(x)')
```



1. Plot the equation y = 0.4 sqrt(1.8x) for 0 <= x <= 35 and 0 <= y <= 3.5.

```
clear all
x = linspace(0,35,200);
y = 0.4 * sqrt(1.8.*x);
plot(x,y)
title('plot of 0.4 * sqrt(1.8x)')
ylabel('f(x)')f
xlabel('x')
```



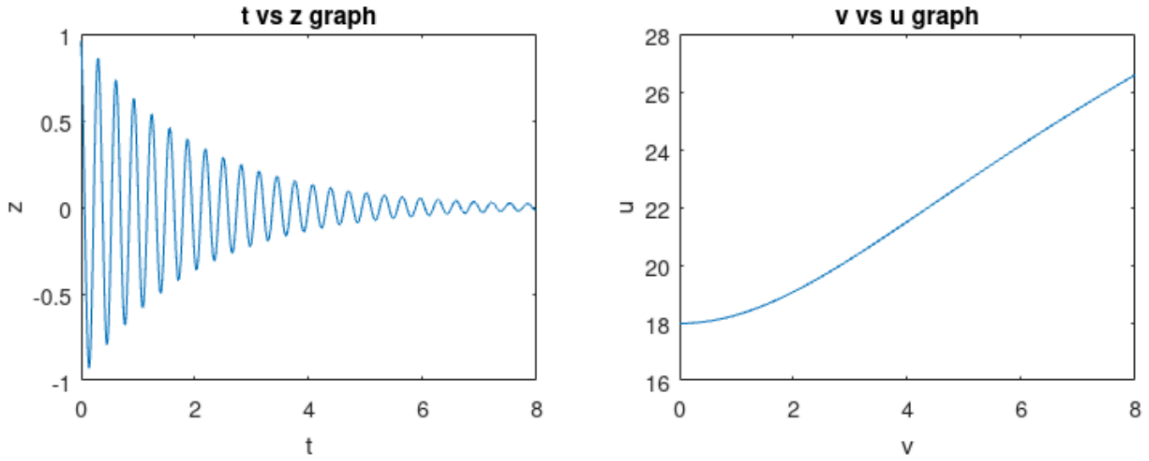


2. Plot the imaginary part vs the real part of the function (0.2 + 0.8i) ^ for 0 <= n <= 20 . Choose enough points to obtain a smooth curve. Label each axis and put a title on the plot.

```
clear all
x1 = 0:0.01:20;
x2 = (0.2 + 0.8i) .^ x1;
realx = real(x2);
imagx = imag(x2);
plot(realx, imagx)
xlabel('real axis')
ylabel('imaginary axis')
title('real vs imaginary graph')
```

3. Pick a suitable spacing for t and v and use the subplot command to plot the function z = exp(-0.5 *t) * cos(20 *t - 6) for 0<=t<=8 and the function u = 6 * log10(v ^2 + 20) for -8<=v<=8. Label each axis.

```
t = 0:0.01:8;
z = exp(-0.5.*t).*cos(20.*t - 6);
subplot(1,2,1)
plot(t,z)
xlabel('t')
ylabel('z')
title('t vs z graph')
v = 0:0.01:8;
u = 6 * log(v.*v + 20);
subplot(1,2,2)
plot(v,u)
xlabel('v')
ylabel('u')
title('v vs u graph')
```



4. Create a Mesh, Surface, and Contour Plot of the function z = e^(x+iy) where x belongs to -1, 1 and y belongs to -2*pi, 2*pi. In each case, plot the real part of z versus x and y.

```
x = linspace(-1, 1, 100);
y = linspace(-2*pi, 2*pi, 100);
```

```
[X, Y] = meshgrid(x, y);
Z = exp(X + 1i*Y);
Z_real = real(Z);
figure;
subplot(1, 3, 1);
mesh(X, Y, Z_real);
title('Mesh Plot');
xlabel('x');
ylabel('y');
zlabel('Re(z)');
subplot(1, 3, 2);
surf(X, Y, Z_real);
title('Surface Plot');
xlabel('x');
ylabel('y');
zlabel('Re(z)');
subplot(1, 3, 3);
contour(X, Y, Z_real, 20);
title('Contour Plot');
xlabel('x');
ylabel('y');
sgtitle('Real Part of z = e^{(x + iy)}');
```