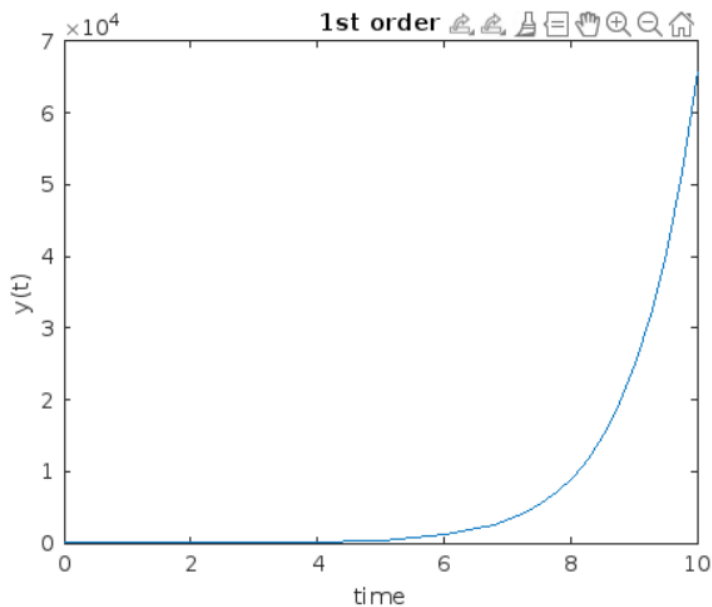# EXPERIMENT 9

AIM: Solving first, second and third order ordinary differential equation using built in functions and plot.
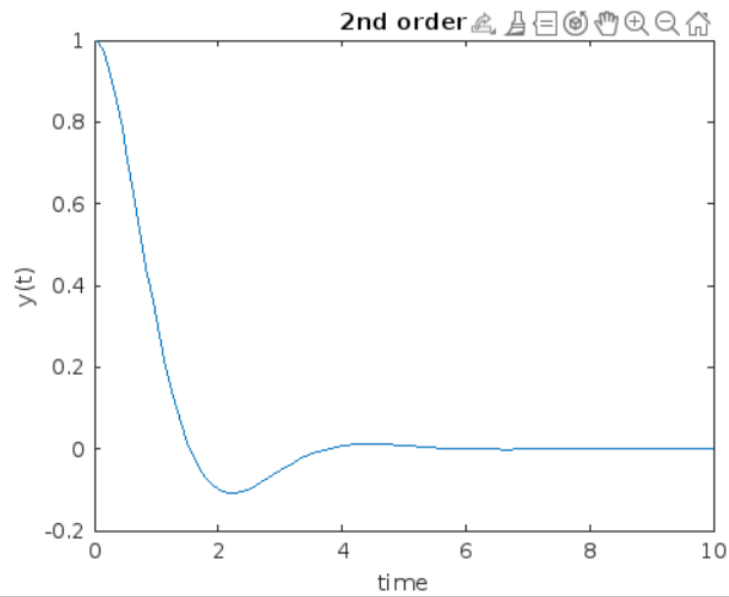
Software required: MATLAB

FIRST ORDER DIFFERENTIAL EQUATION-

```
f = @(t, y) t^2 + y;
tspan = [0 10];
y0 = 1;
[t, y] = ode45(f, tspan, y0);
plot(t, y);
xlabel('time')
ylabel('y(t)')
title('1st order')
```
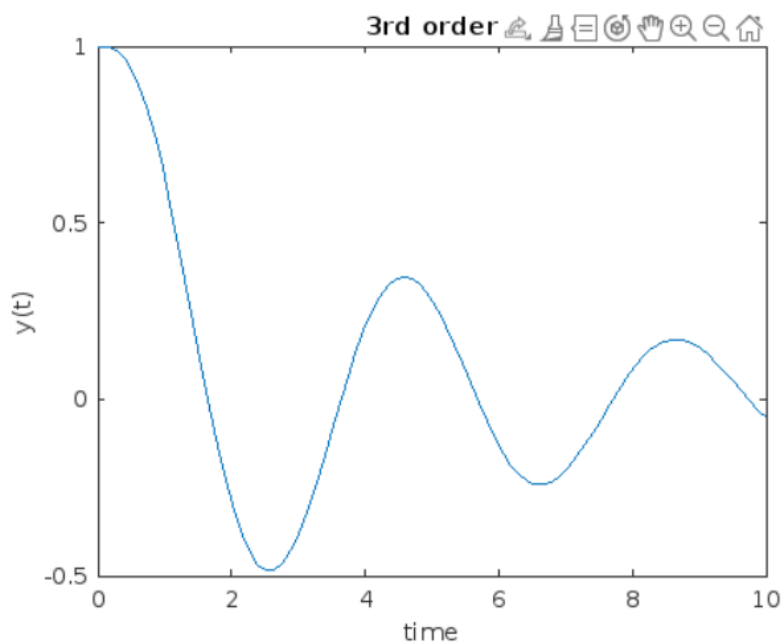

SECOND ORDER DIFFERENTIAL EQUATION-

```
f = @(t, y) [y(2); -2*y(2) - 3*y(1)];
tspan = [0 10];
y0 = [1; 0];
[t, y] = ode45(f, tspan, y0);
plot(t, y(:, 1));
xlabel('time')
ylabel('y(t)')
title('2nd order')
```

THIRD ORDER DIFFERENTIAL EQUATION-

```
f = @(t, y) [y(2); y(3); -2*y(3) - 3*y(2) - 4*y(1)];
tspan = [0 10];
y0 = [1; 0; 0];
[t, y] = ode45(f, tspan, y0);
plot(t, y(:, 1));
xlabel('time')
ylabel('y(t)')
title('3rd order')
```


CONCLUSION- First, second and third order ordinary differential equation is solved and plotted using built in functions on matlab
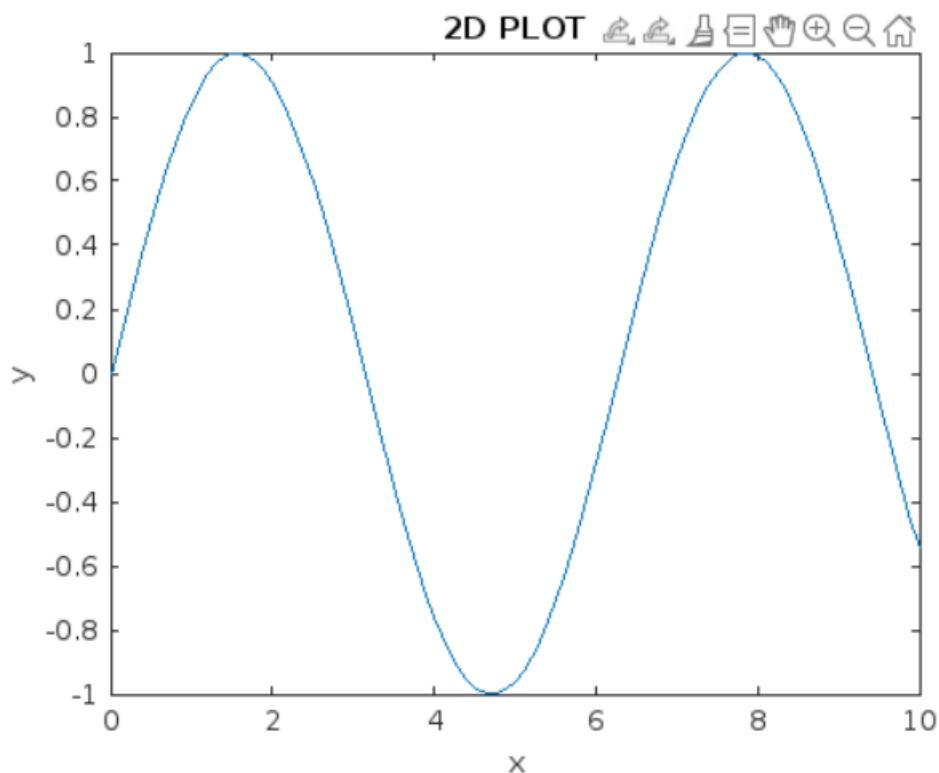
EXPERIMENT 10

AIM: Basic 2D and 3D plots,parametric space curve , polygons with vertices, 3D contour lines , pie and bar charts.

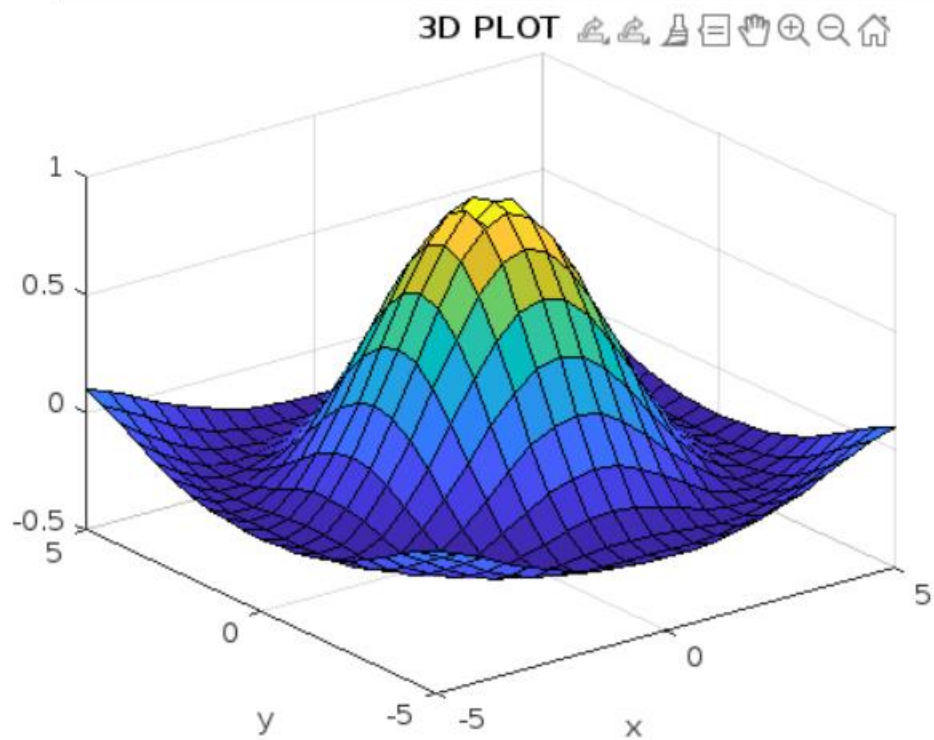**Software required:** MATLAB

2D PLOT

```
x = 0:0.1:10;
y = sin(x);
plot(x, y)
xlabel('x')
ylabel('y')
title('2D PLOT')
```
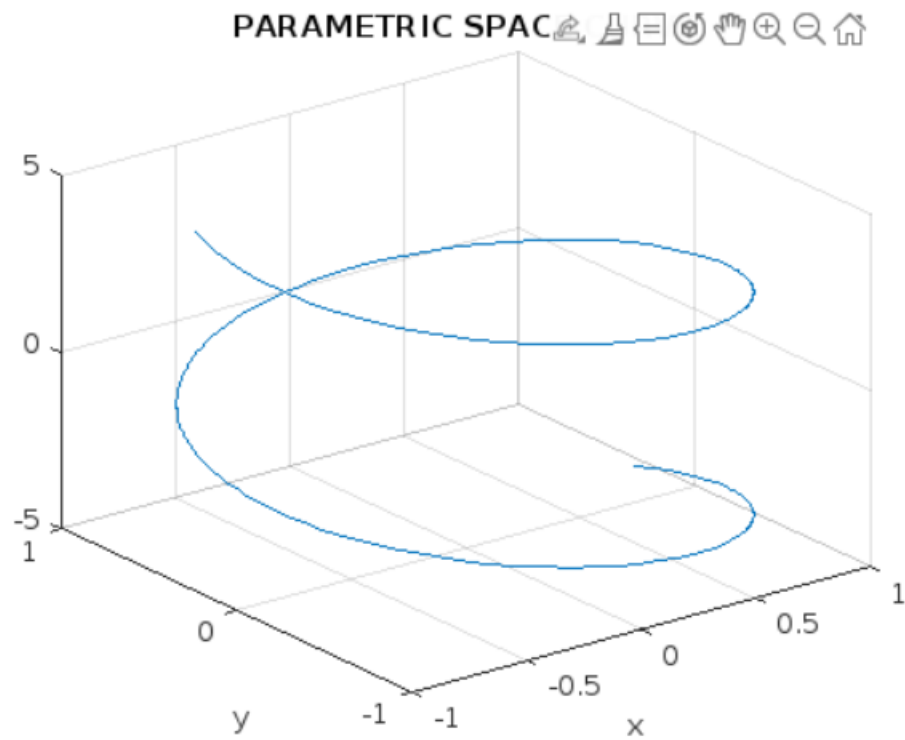

3D PLOT

```
x = -5:0.5:5;
y = -5:0.5:5;
[X,Y] = meshgrid(x,y);
Z = sin(sqrt(X.^2 + Y.^2))./(sqrt(X.^2 + Y.^2));
surf(X,Y,Z)
xlabel('x')
```
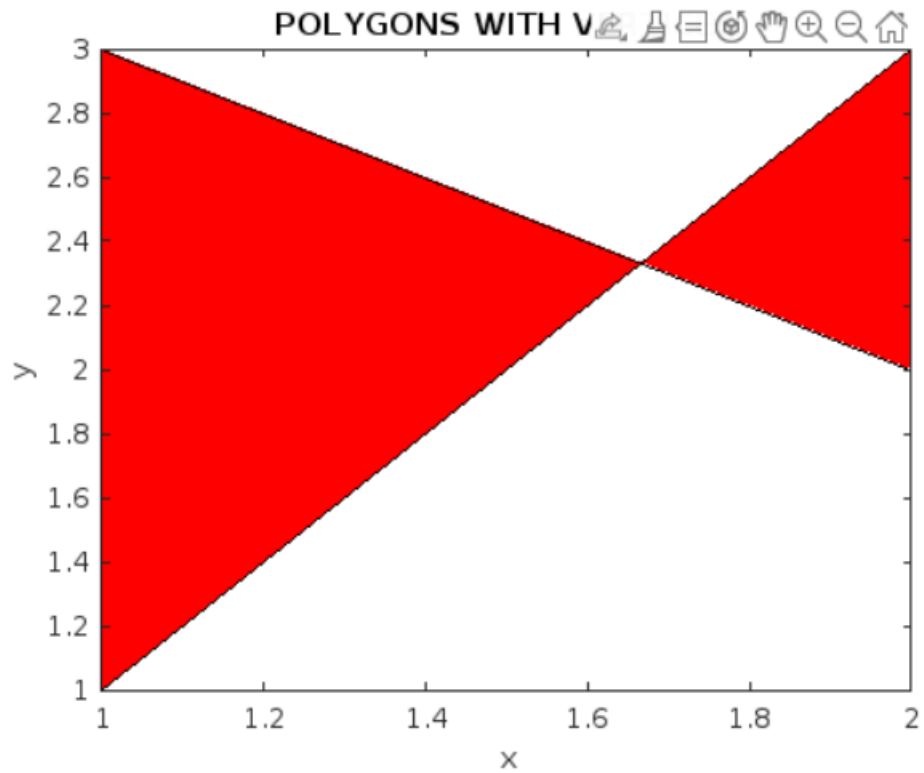
```
ylabel('y')
title('3D PLOT')
```


3D PLOT

PARAMETRIC SPACE CURVE

```
syms t
xt = sin(t);
yt = cos(t);
zt = t;
fplot3(xt,yt,zt)
xlabel('x')
ylabel('y')
title('PARAMETRIC SPACE CURVE')
```
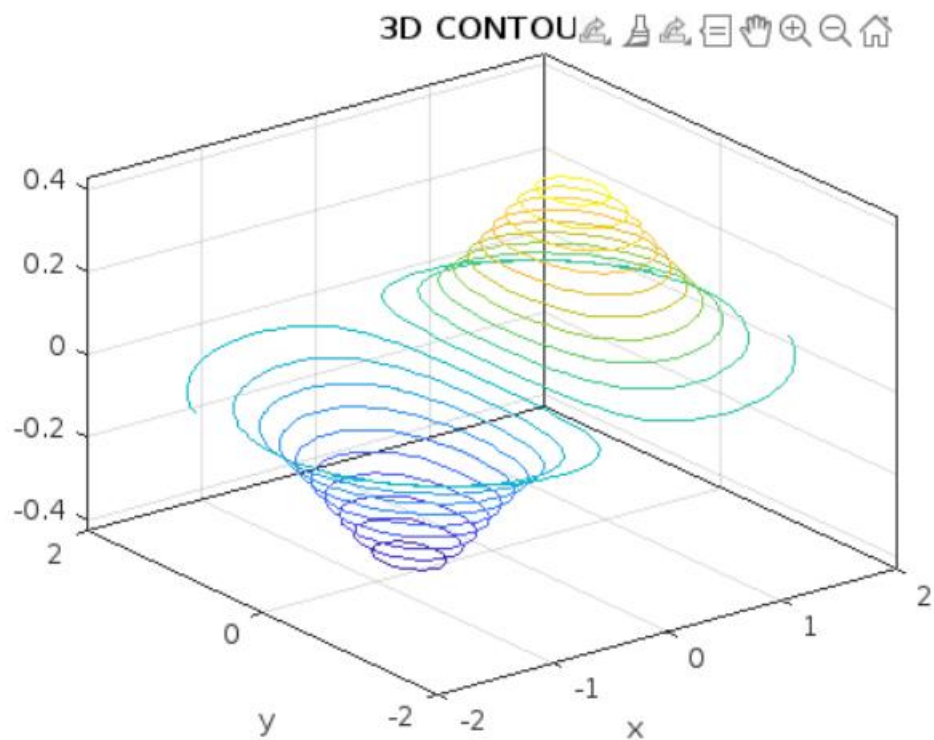
POLYGONS WITH VERTICES

```matlab
x = [1 2 2 1];
y = [1 3 2 3];
fill(x, y, 'r')
xlabel('x')
ylabel('y')
title('POLYGONS WITH VERTICES')
```
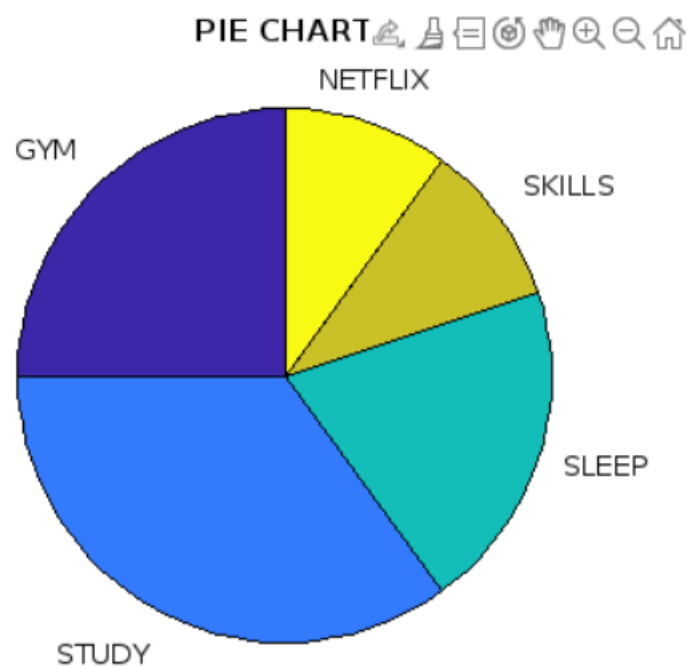
3D CONTOUR

```
x = -2:0.1:2;
y = -2:0.1:2;
[X,Y] = meshgrid(x,y);
Z = X.*exp(-X.^2-Y.^2);
contour3(X,Y,Z,20)
xlabel('x')
ylabel('y')
title('3D CONTOUR')
```
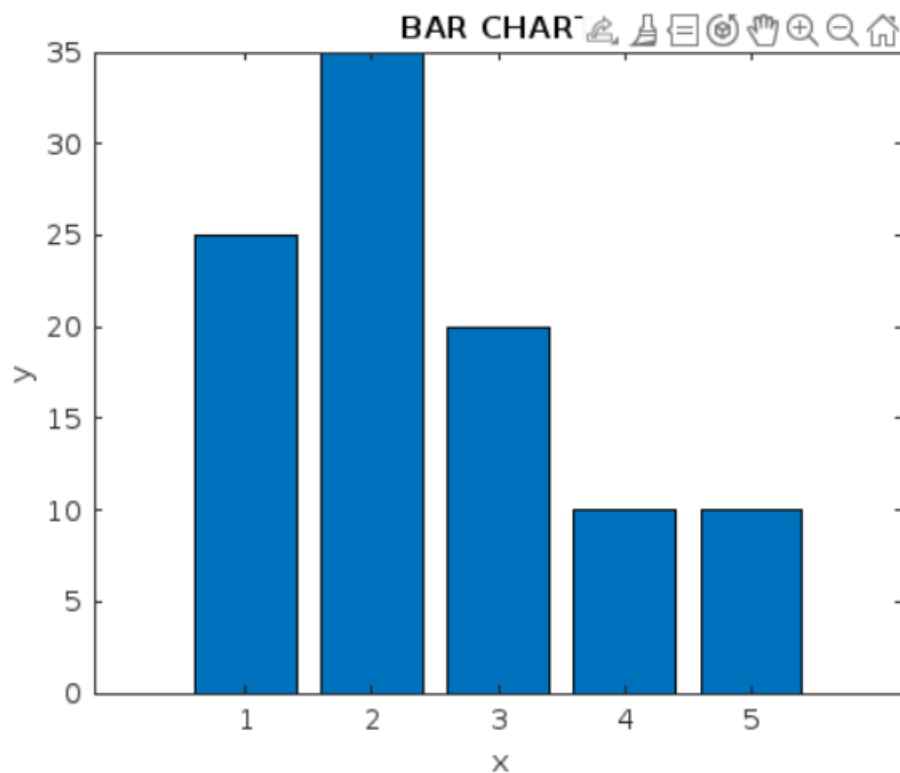
PIE CHART

```
values = [25 35 20 10 10];
labels = {'GYM','STUDY','SLEEP','SKILLS','NETFLIX'};
pie(values, labels)
xlabel('x')
ylabel('y')
title('PIE CHART')
```

BAR CHART

```
x = 1:5;
y = [25 35 20 10 10];
bar(x, y)
xlabel('x')
ylabel('y')
title('BAR CHART')
```


CONCLUSION- Basic 2D and 3D plots,parametric space curve , polygons with vertices, 3D contour lines , pie and bar charts are drawn.