CFE - LAB ASSIGNMENT 1-2

1. MATLAB - BASICOPERATIONS

```
1.  Clc
2.  clear all
3.  Close all
4.  rv=[1 2 3 4 5]      % row vector
```

OUTPUT

```
rv =
     1     2     3     4     5
```

```
5.  cv=rv'                  % ' - Transpose
```

OUTPUT

```
cv =

     1
     2
     3
     4
     5
```

```
6.  cv2=[1;2;3;4;5]  % column vector
```

OUTPUT

```
cv2 =

     1
     2
     3
     4
     5
```

7. `lrv=length(rv);`

OUTPUT

```
lrv =

     5
```

8. `srv=size(rv);`

OUTPUT

```
srv =

     1     5
```

9. `A=[1 2;3 4]`

OUTPUT

```
A =

     1     2
     3     4
```

10. `dA=det(A)`

OUTPUT

```
dA =

    -2
```

11. `rA=rank(A)`

OUTPUT

```
rA  =

     2
```

12. `lA=tril(A)`

OUTPUT

```
lA =

     1     0
     3     4
```

13. `uA=triu(A)`

OUTPUT

```
uA =

     1     2
     0     4
```

14. `dA=diag(A)`

OUTPUT

```
dA =

     1
     4
```

15. `B=[4 5;8 12]`

OUTPUT

```
B =

     4     5
     6     7
```

16. `C=A+B`

OUTPUT

```
C =

     5     7
     9    11
```

17. `D1=A*B    % * - matrix multiplication`

OUTPUT

```
D1 =

    16    19
    36    43
```

18. `D2=A.*B  % .* - component-wise multiplication`

OUTPUT

```
D2 =

     4    10
    18    28
```

19. `E=inv(A)  % inv(A) - inverse of matrix A`

OUTPUT

```
E =

   -2.0000    1.0000
    1.5000   -0.5000
```

20. `F1=B'`

OUTPUT

```
F1 =

     4     6
     5     7
```

21. `H=A.^3`

OUTPUT

```
H =

     1     8
    27    64
```

22. `A=[1 2 3 4;5 6 7 8;9 10 11 12;13 14 15 16]`

OUTPUT

```
A =

     1     2     3     4
     5     6     7     8
     9    10    11    12
    13    14    15    16
```

23. `size(A)`

OUTPUT

```
ans =

     4     4
```

Slicing a Matrix

24. `A(2,:)=[]  % removes the elements of row 2`

OUTPUT

```
A =

     1     2     3     4
     9    10    11    12
    13    14    15    16
```

25. `size(A)`

OUTPUT

```
ans =

     3     4
```

26. `A(:,3)=[]  % removes the elements of column 3`

OUTPUT

```
A =

     1     2     4
     9    10    12
    13    14    16
```

27. `size(A)`

OUTPUT

```
ans =

     3     3
```

28. `sm1=A(2:3,2:3)`

OUTPUT

```
    sm1 =

         10    12
         14    16
```

29. `sm2=A([1 3],[2 1])`

OUTPUT

```
  sm2 =

       2     1
       14    13
```

Transpose operations

30. `x=[1 2 3 4 5]`

OUTPUT

```
x =

     1     2     3     4     5
```

31. `y=[2 2 2 3 3]`

OUTPUT

```
y =

     2     2     2     3     3
```

32. `z1=x*y'`

OUTPUT

```
z1 =

    39
```

33. `z2=x'*y`

OUTPUT

```
z2 =

     2     2     2     3     3
     4     4     4     6     6
     6     6     6     9     9
     8     8     8    12    12
    10    10    10    15    15
```

34. `z3=x.*y`

OUTPUT

```
z3 =

     2     4     6    12    15
```

35. `z4=x.^y`

OUTPUT

```
z4 =

     1     4     9    64   125
```

```
36.   z5=x./y
```

```
z5 =

    0.5000    1.0000    1.5000    1.3333    1.6667
```

2. SOLVING SYSTEM OF EQUATIONS

```
A=[4 5;7 8]
```

OUTPUT

```
A =

   4     5
   7     8
```

```
b=[7 21]'
```

OUTPUT

```
b =

    7
    21
```

```
x=A\b
```

OUTPUT

```
x =

   16.3333
  -11.6667
```

3. PARAMETRIC PLOTTING

```
clc
```

```
clear all
close all
t = linspace(0, 2*pi,20);
```

OUTPUT

```
 t =

       0    0.3307    0.6614    0.9921    1.3228    1.6535    1.9842
2.3149    2.6456    2.9762    3.3069    3.6376    3.9683    4.2990
4.6297    4.9604    5.2911    5.6218    5.9525    6.2832
```

```
x = 3+2*cos(t);
```

OUTPUT

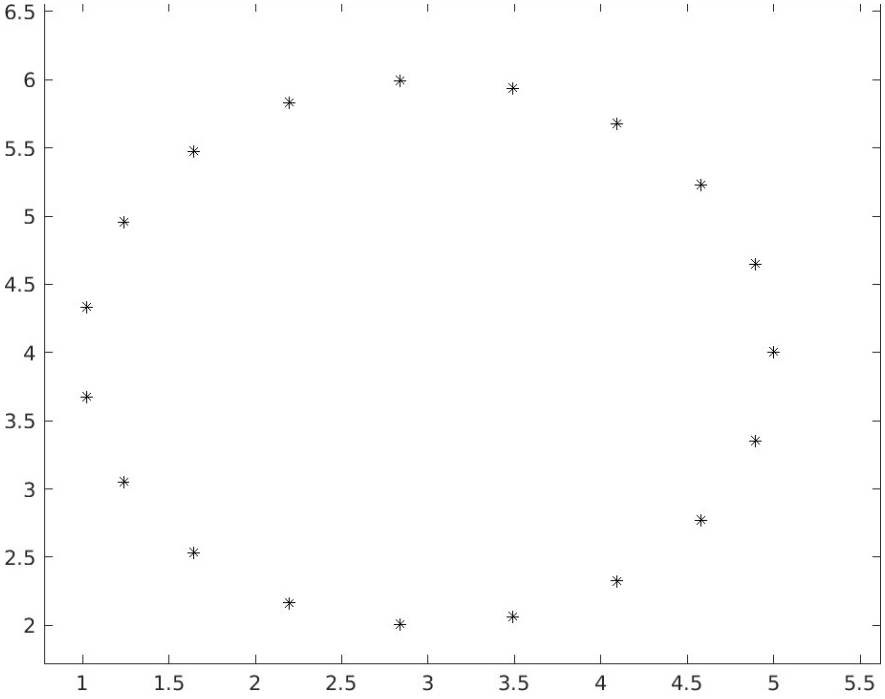
```
 x =

         5.0000    4.8916    4.5783    4.0939    3.4910    2.8348
2.1966    1.6454    1.2411    1.0273    1.0273    1.2411    1.6454
2.1966    2.8348    3.4910    4.0939    4.5783    4.8916    5.0000
```

```
y = 4+2*sin(t);
```

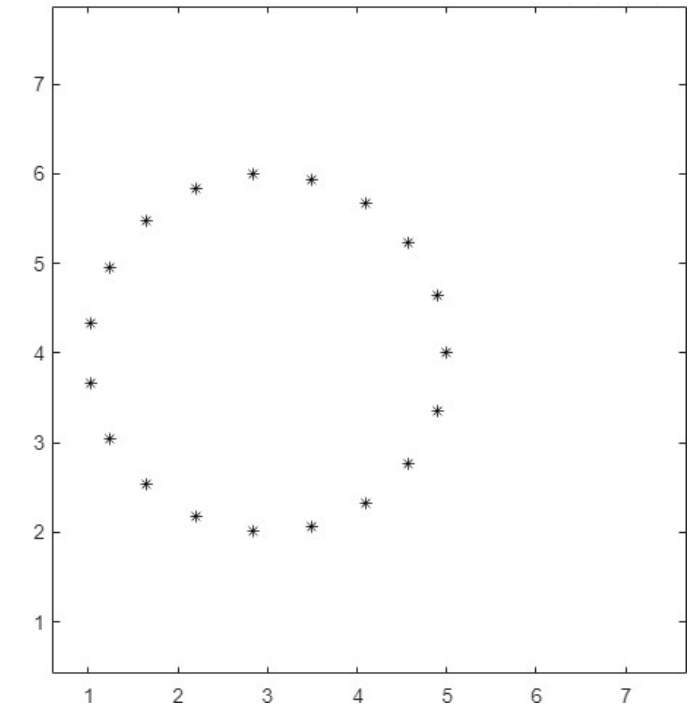
OUTPUT

```
 y =

         4.0000    4.6494    5.2284    5.6743    5.9388    5.9932
5.8315    5.4714    4.9519    4.3292    3.6708    3.0481    2.5286
2.1685    2.0068    2.0612    2.3257    2.7716    3.3506    4.0000
```

```
plot(x,y,'k*')
```

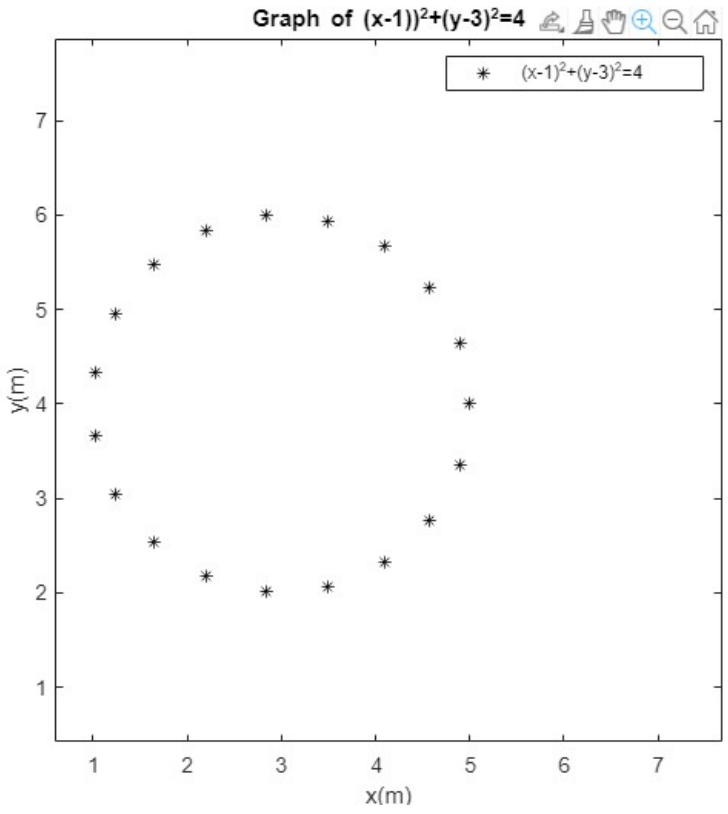



```
axis equal
```




```
xlabel('x(m)')
ylabel('y(m)')
```

```
title('graph of (x-1)^2+(y-3)^2=4') legend('(x-1)^2+(y-3)^2=4')
```



5. MULTIPLE PLOTS IN A FIGURE WINDOW (USING COMMAND HOLD ON)

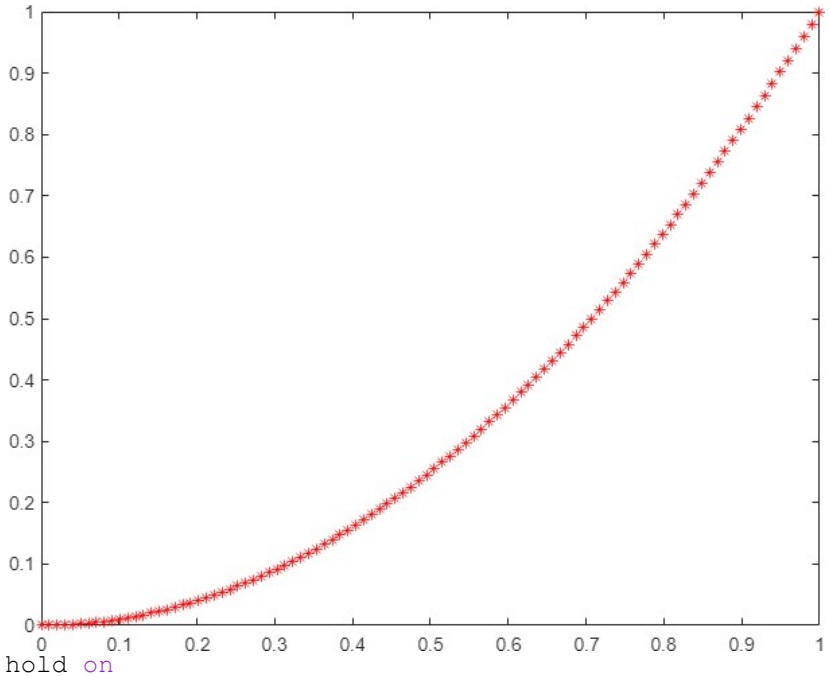
```
clc clear all
close all
x=linspace(0,1)
```

OUTPUT

```
x =

   Columns 1 through 20

         0    0.0101    0.0202    0.0303    0.0404    0.0505    0.0606
0.0707    0.0808    0.0909    0.1010    0.1111    0.1212    0.1313
0.1414    0.1515    0.1616    0.1717    0.1818    0.1919

  Columns 21 through 40

    0.2020    0.2121    0.2222    0.2323    0.2424    0.2525    0.2626
0.2727    0.2828    0.2929    0.3030    0.3131    0.3232    0.3333
0.3434    0.3535    0.3636    0.3737    0.3838    0.3939

  Columns 41 through 60
```

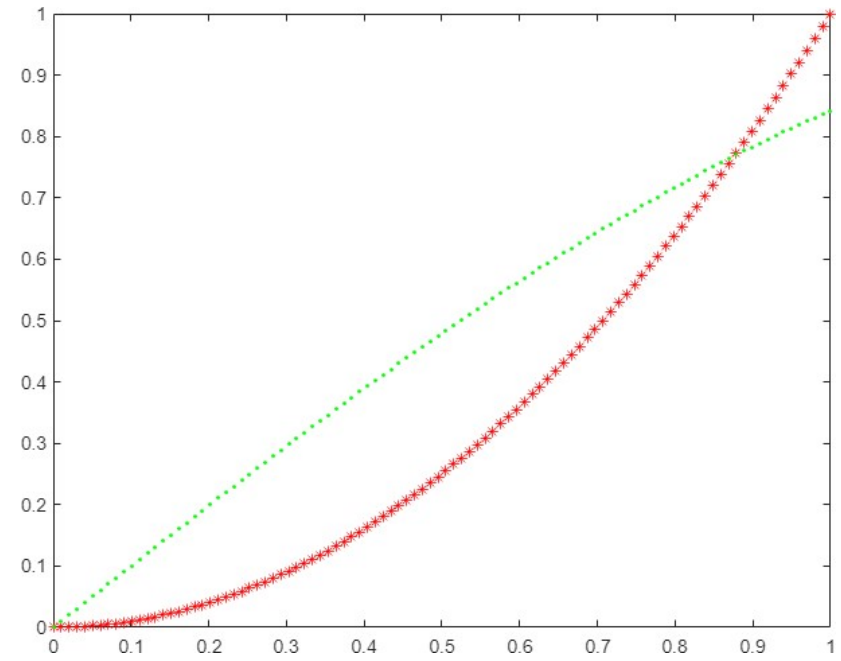
```
    0.4040    0.4141    0.4242    0.4343    0.4444    0.4545    0.4646
0.4747    0.4848    0.4949    0.5051    0.5152    0.5253    0.5354
0.5455    0.5556    0.5657    0.5758    0.5859    0.5960

  Columns 61 through 80

    0.6061    0.6162    0.6263    0.6364    0.6465    0.6566    0.6667
0.6768    0.6869    0.6970    0.7071    0.7172    0.7273    0.7374
0.7475    0.7576    0.7677    0.7778    0.7879    0.7980

  Columns 81 through 100

    0.8081    0.8182    0.8283    0.8384    0.8485    0.8586    0.8687
0.8788    0.8889    0.8990    0.9091    0.9192    0.9293    0.9394
0.9495    0.9596    0.9697    0.9798    0.9899    1.0000
```

```
plot(x,x.^2,'r*')
```

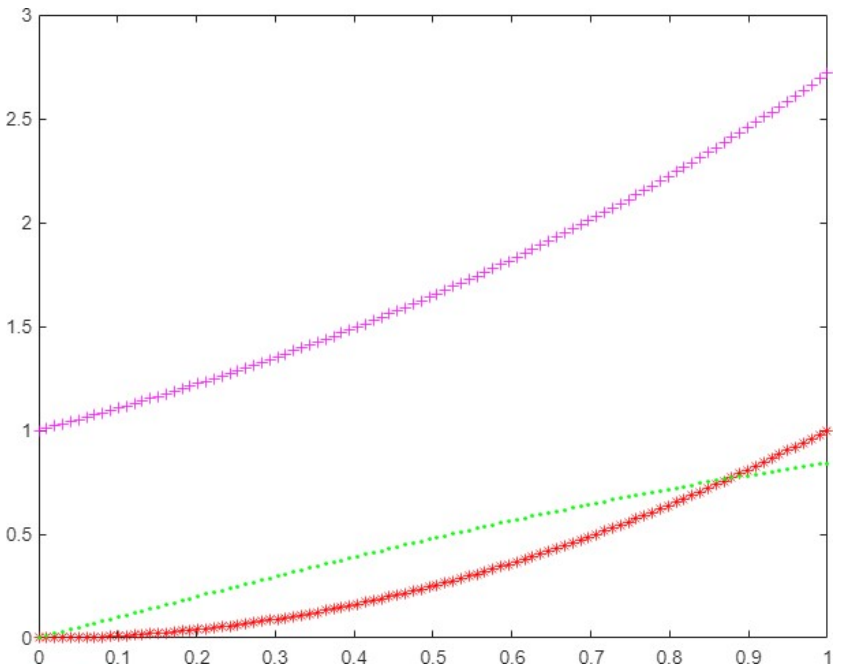



```
hold on
```

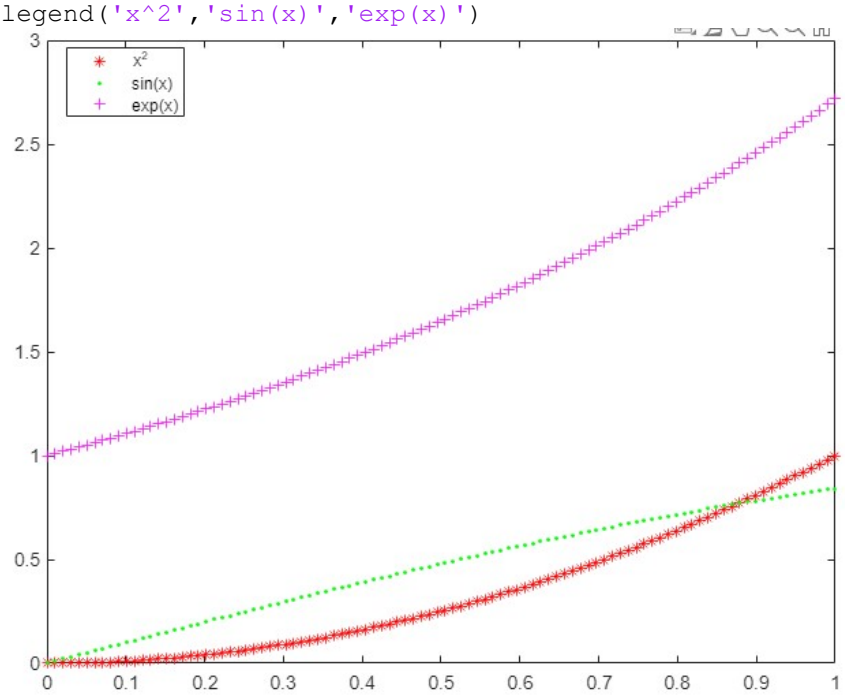
```
plot(x,sin(x),'g.)
```




```
plot(x,exp(x),'m+)
```



```
legend('x^2','sin(x)','exp(x)')
```



6. MULTIPLE GRAPHS IN A FIGURE WINDOW BY USING SUBPLOT

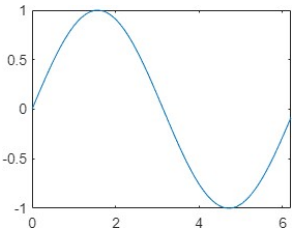
```
clc
clear all
close all
x=0:0.1:2*pi;
```

OUTPUT

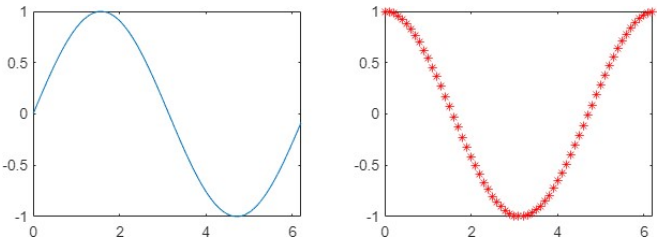
```
x =

  Columns 1 through 20

         0    0.1000    0.2000    0.3000    0.4000    0.5000    0.6000
0.7000    0.8000    0.9000    1.0000    1.1000    1.2000    1.3000
1.4000    1.5000    1.6000    1.7000    1.8000    1.9000

  Columns 21 through 40

    2.0000    2.1000    2.2000    2.3000    2.4000    2.5000    2.6000
2.7000    2.8000    2.9000    3.0000    3.1000    3.2000    3.3000
3.4000    3.5000    3.6000    3.7000    3.8000    3.9000

  Columns 41 through 60
```

```
    4.0000    4.1000    4.2000    4.3000    4.4000    4.5000    4.6000
4.7000    4.8000    4.9000    5.0000    5.1000    5.2000    5.3000
5.4000    5.5000    5.6000    5.7000    5.8000    5.9000

  Columns 61 through 63

    6.0000    6.1000    6.2000
```

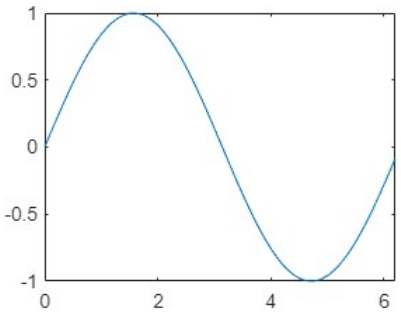
```
subplot(2,2,1)
plot(x,sin(x));
```

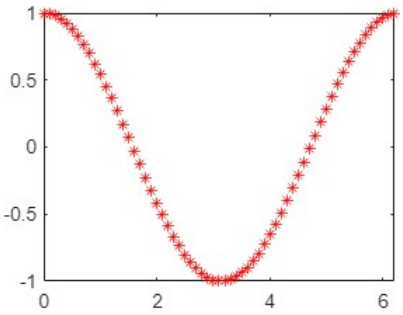


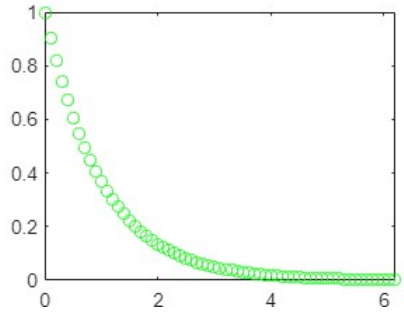

```
subplot(2,2,2)
plot(x,cos(x),'r*');
```



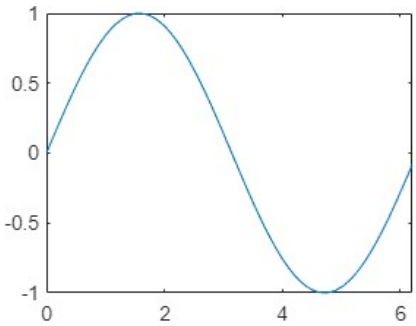
```
subplot(2,2,3)
plot(x,exp(-x),'go')
```

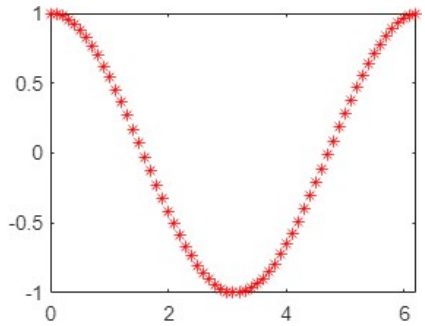


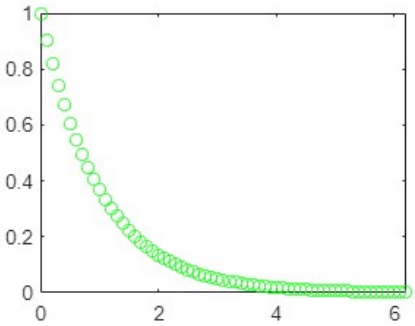


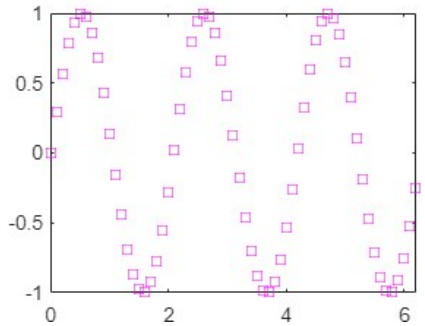


```
subplot(2,2,4);
plot(x,sin(3*x),'ms)
```









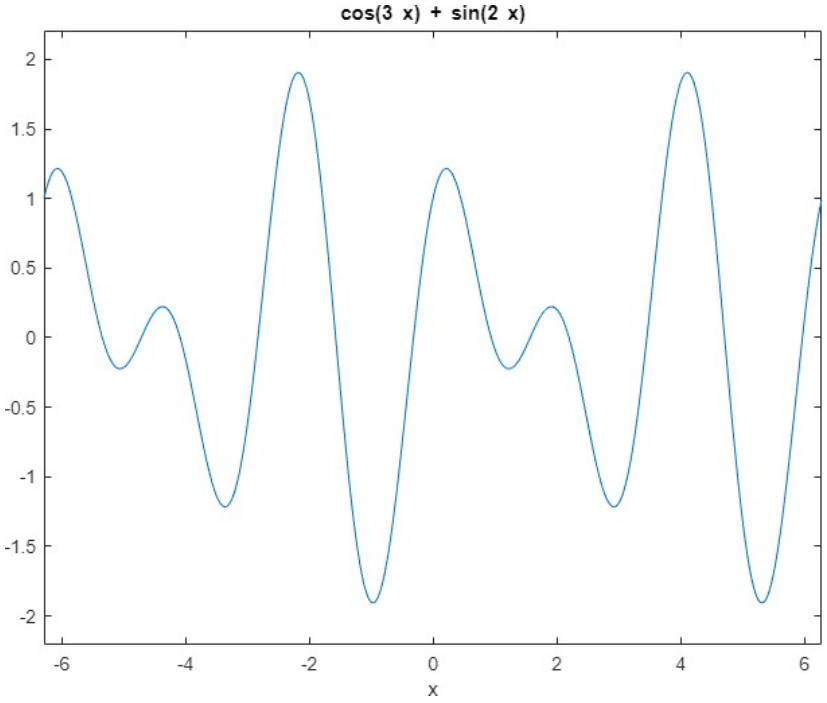
7. GRAPH OF A CURVE THROUGH EZPLOT COMMAND

```
clc clear
all
syms x% Declaring the parameters as a symbolic
object
f=sin(2*x)+cos(3*x)
```

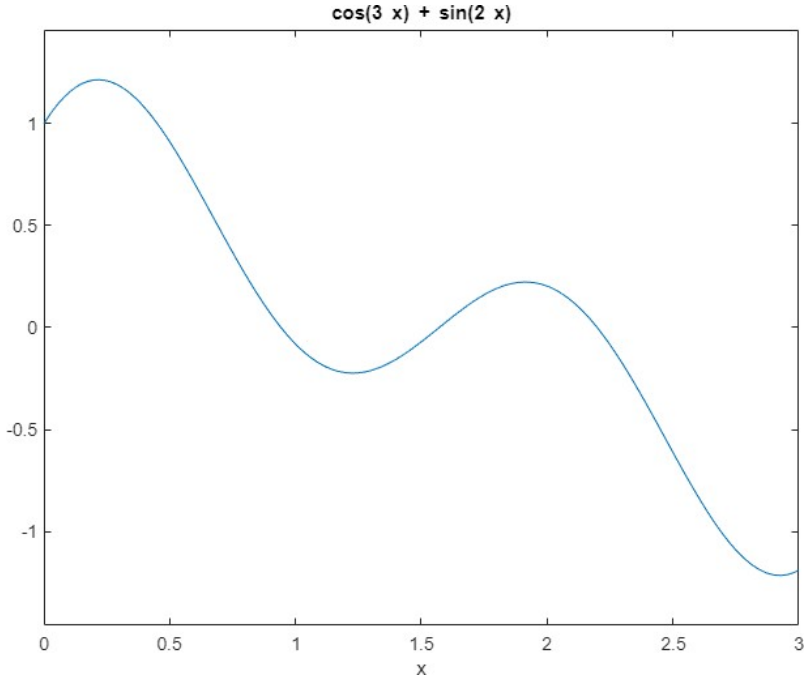
OUTPUT

```
f =

   cos(3*x) + sin(2*x)
```

```
figure(1)
ezplot(f)
```



```
figure(2)
ezplot(f,[0,3])
```



8. GRAPH OF A CURVE AND ITS TANGENT LINE IN THE NEIGHBOURHOOD D OF A POINT.

```
Syms x
%y=input('enter the function f in terms of x:')% Example, Try the
function y=x^2-2*x;
y=x^2-2*x;
```

OUTPUT

```
y =

   x^2 - 2*x
```

```
%x1 = input('Enter x value at which tangent  : '); % Example, Try
the point x1 =  2
x1=2;
```

OUTPUT

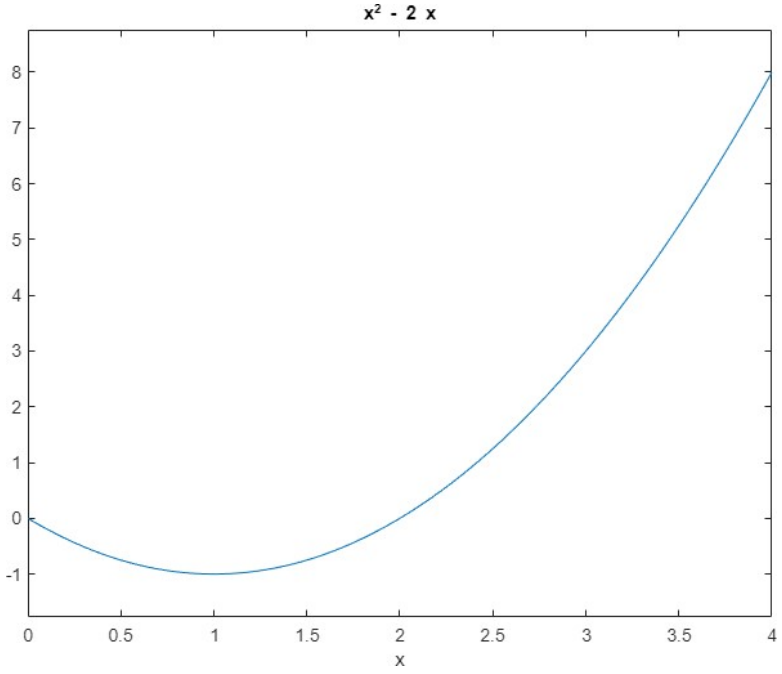
```
 x1 =

     2
```

```
D=[x1-2 x1+2]% Region about x1 (or Neighbourhood of x1)
```

OUTPUT

```
D =

    0     4
```

```
ezplot(y,D)    % graph of the curve in D
```




```
hold on
```

Equation of the tangent line passing through x1.

```
yd = diff(y,x); % Differentiation in MATLAB
```

OUTPUT

```
     yd =

        2*x - 2
```

```
 slope = subs(yd,x,x1); % Finding the slope at x1
```

OUTPUT

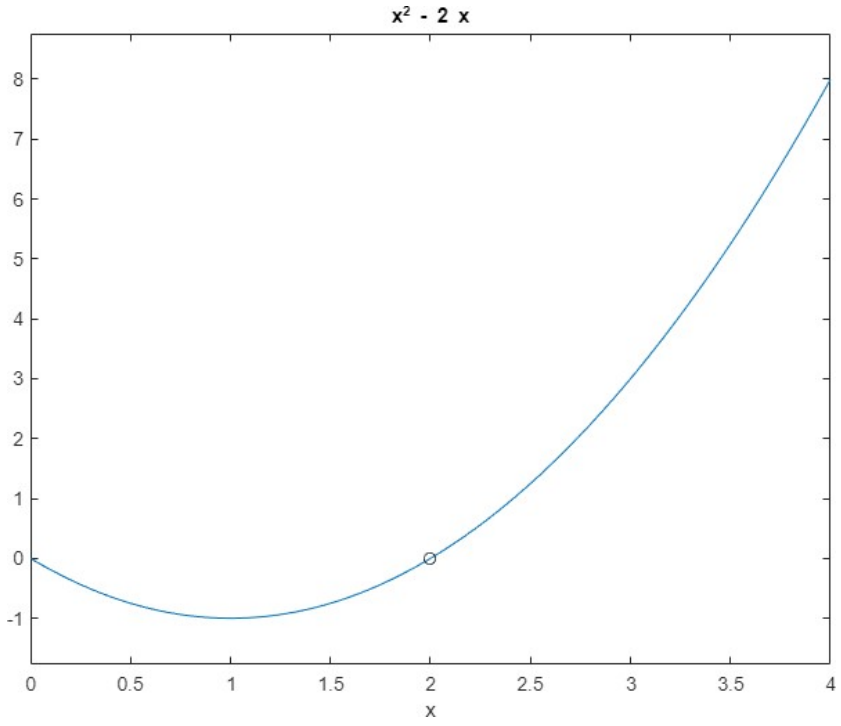
```
slope =

       2
```

```
y1 = subs(y,x,x1); % Finding the value of the
function at the given point
```

OUTPUT

```
y1 =

     0
```

```
plot(x1,y1,'ko')        % plot the point
```

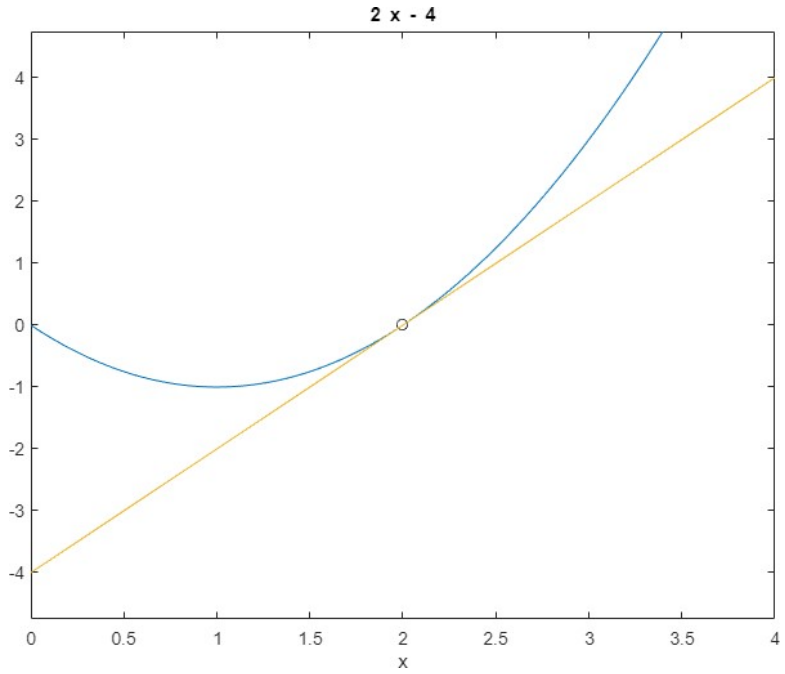



```
Tgt_line = slope*(x-x1)+y1 % Tangent Line Equation at the given
point
```

OUTPUT

```
Tgt_line =

2*x - 4
```

```
h = ezplot(Tgt_line,D);     % Plotting the Tangent Line
```




```
set(h,'color','r')
```