Experiment:3
Two Dimensional Plots

1. **Plotting of the functions**

1.Plot the below functions and label the axes.

(a) Plot the function $f(t) = (x + 5)^2$ for $-3 \leq x \leq 5$.

(b) Plot the function $f(t) = \frac{5sin(x)}{x+e^{-0.75x}} - \frac{3}{5}x$ for $-5 \leq x \leq 10$

(c) Use the fplot command to plot the function

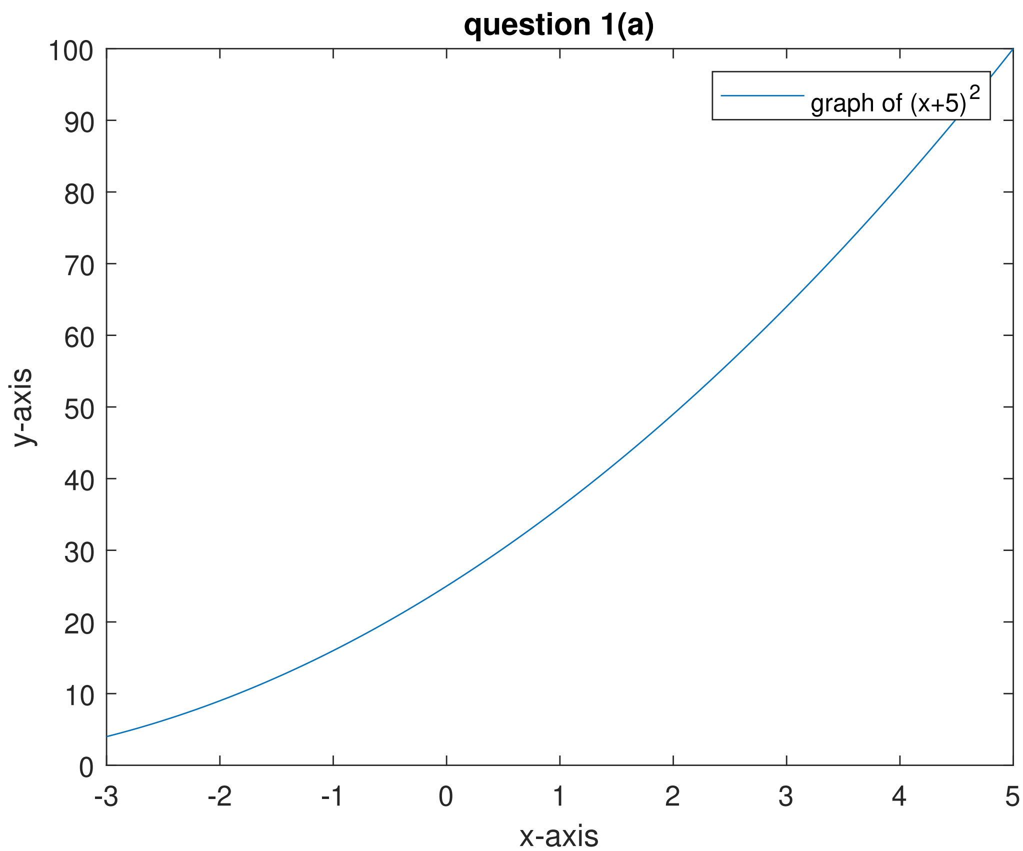
$$f(x) = \sqrt{|cos(3x)|} + sin^2(4x)$$

.

2.Plot the cos(x) and sin(x) for $-\pi \leq x \leq \pi$ into the same plot.

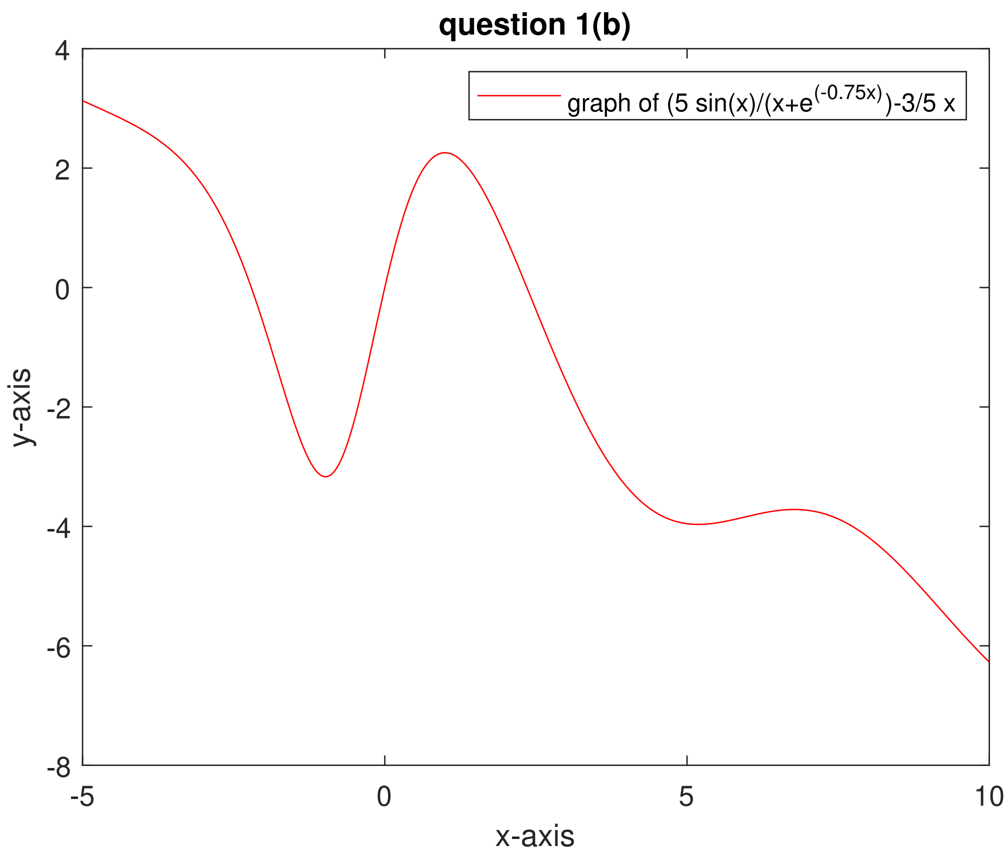
Solution. 1.a

```
x=[-3:0.01:5];
y=((x+5).^2)
plot(x,y)
xlabel("x-axis")
ylabel("y-axis")
legend("graph of (x+5)^2")
title("question 1(a)")
```



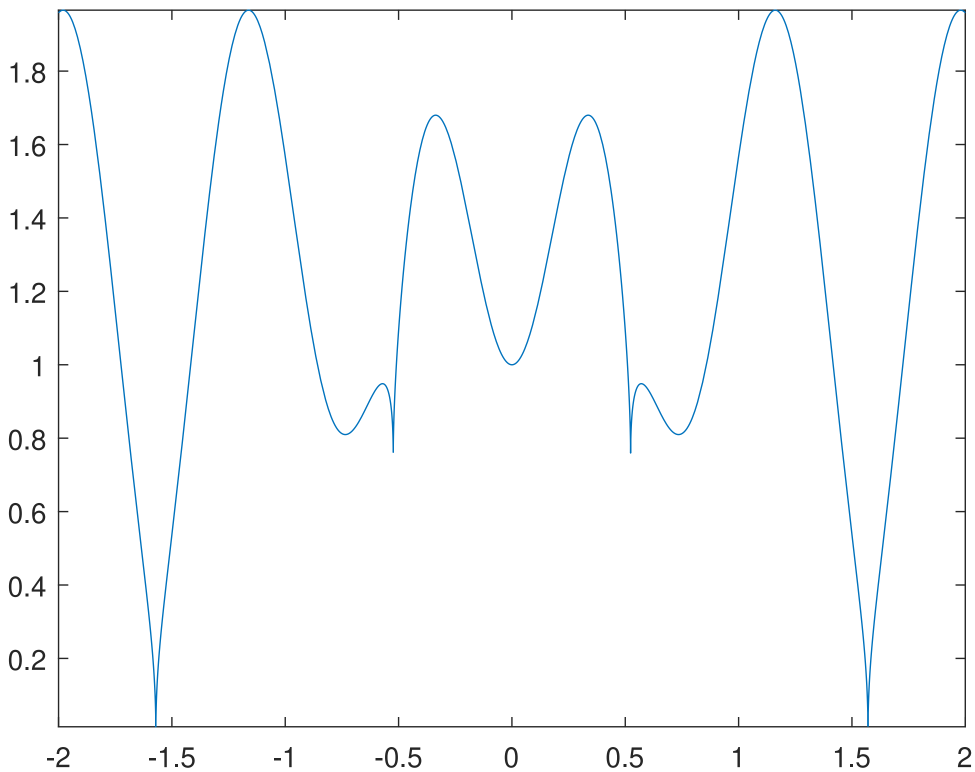
1.b

```
x=[-5:0.01:10];
y=(5.*sin(x)./(x+exp(-0.75*x)))-3/5 .*x
plot(x,y,"r")
xlabel("x-axis")
ylabel("y-axis")
legend("graph of (5 sin(x)/(x+e^{(-0.75x)})-3/5 x")
title("question 1(b)")
```



1.c

```
fplot("sqrt(abs(cos(3*x)))+(sin(4*x))^2",[-2 2])
```



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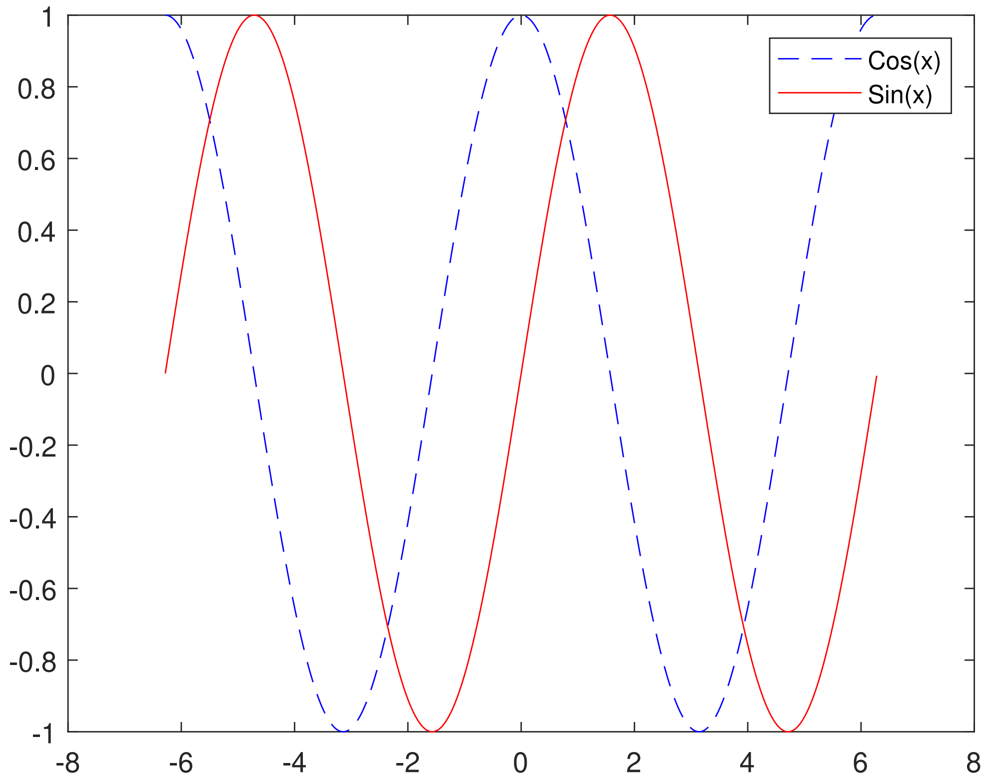
Solution. 2.

```
x=[-2*pi:0.01:2*pi];
y1=cos(x);
y2=sin(x);
plot(x,y1,"--b")
hold on
plot(x,y2,"r")
legend("Cos(x)","Sin(x)")
hold off
```



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2. **Span of Vectors using quiver3 command**

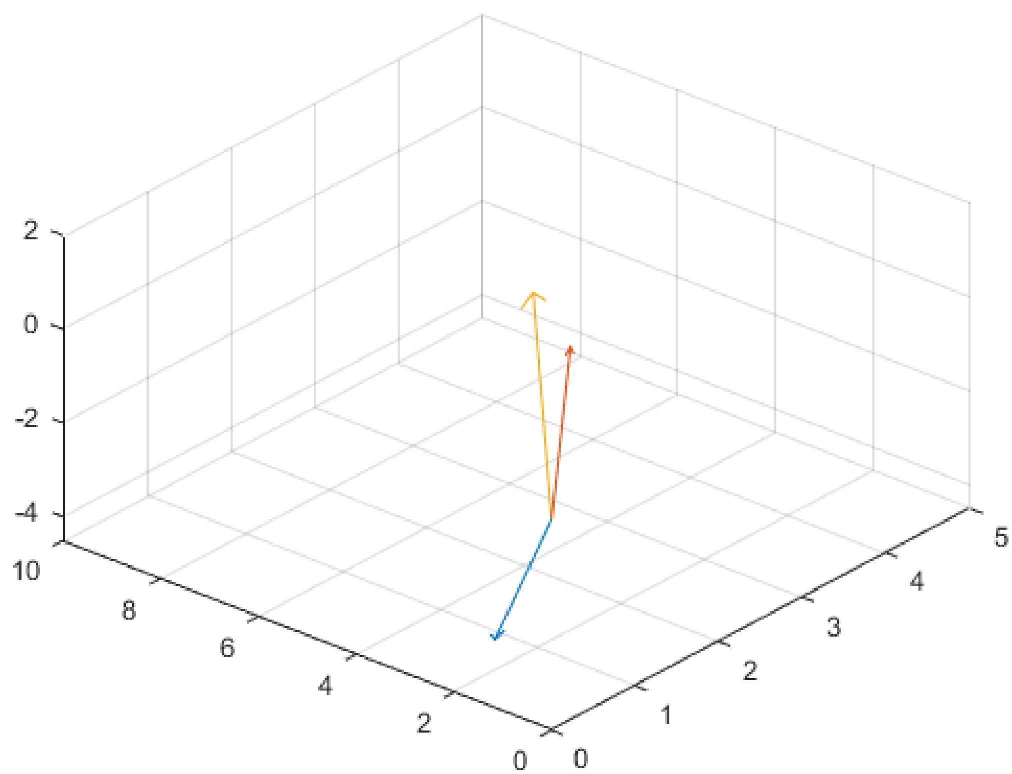
1.Using the quiver3 command together with hold on, plot the vectors.Check whether the column vectors are linearly dependent or independent by observing their geometric structure.

(a) $v_1 = \begin{bmatrix} 1 \\ 3 \\ -5 \end{bmatrix}, v_2 = \begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}, v_3 = \begin{bmatrix} 5 \\ 9 \\ -3 \end{bmatrix}$

2. Write a MATLAB program as a function to create a plot of the span of the two vectors $v_1 = \begin{bmatrix} 5 \\ 4 \\ 0 \end{bmatrix}$ and $v_2 = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ in R^3

Solution.

```
 v1=[1 3 -5];
 v2=[2 3 1];
 v3=[5 9 -3];
quiver3(0,0,0,v1(1),v1(2),v1(3));
hold on
quiver3(0,0,0,v2(1),v2(2),v2(3));
quiver3(0,0,0,v3(1),v3(2),v3(3));
hold off
```



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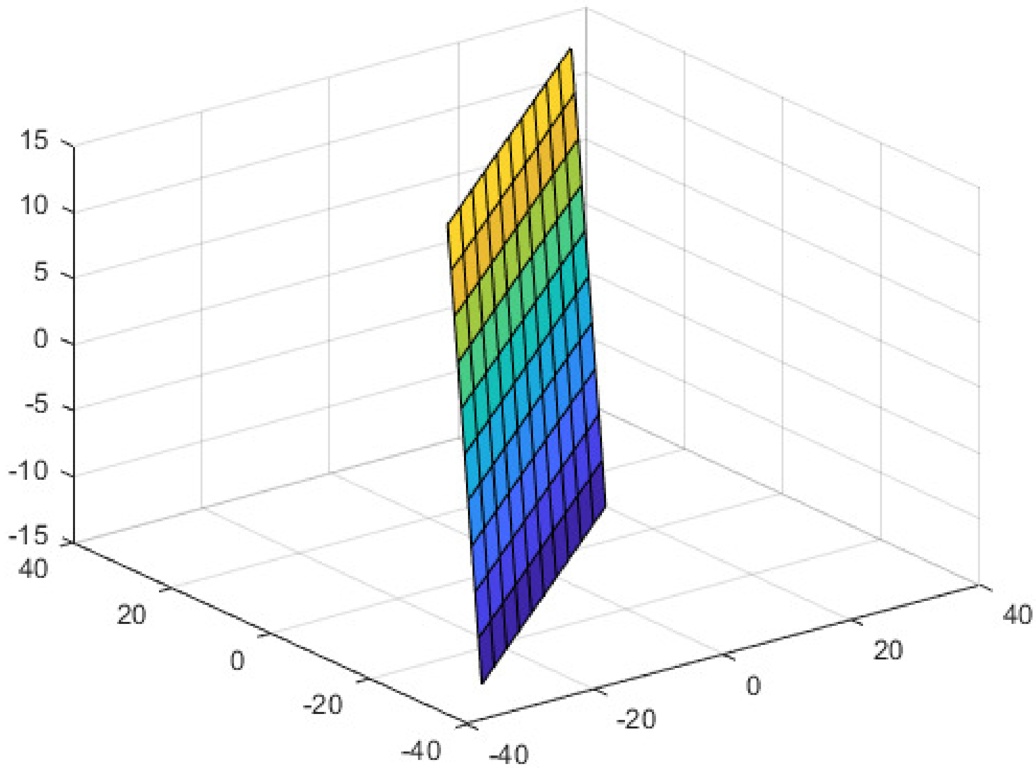
Solution.

```
  v1=[5 4 0];
  v2=[1 2 3];
p1=@(s,t) v1(1)*s+v2(1)*t;
p2=@(s,t) v1(2)*s+v2(2)*t;
p3=@(s,t) v1(3)*s+v2(3)*t;
[T,S]=meshgrid(-5:1:5);
px=p1(T,S);
```

```
py=p2(T,S);
pz=p3(T,S);
surf(px,py,pz)
```



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3. Classification of singular and non singular matrix using if statement

Check Whether the given matrices are non-singular or not and if matrix is non singular find its inverse.

$$\begin{bmatrix} 1 & 3 \\ 2 & 5 \end{bmatrix}, \begin{bmatrix} 1 & 3 & 3 \\ 3 & 4 & 6 \\ 8 & 9 & 0 \end{bmatrix}$$

Algorithm
// Input: Matrix A
// Output: if matrix is singular than print singular otherwise show its inverse

Step1: Input one matrix.

Step2:
if the determinant of A is not equal to zero.
print A is non singular.
print inverse of A
else
print A is singular

end if

Solution.

```
A=[1 3;2 5];
if det(A)~=0
    disp("Matrix is non singular ")
    disp(inv(A))
else
    disp("Matrix is singular")
end
```

```
Matrix is non singular
    -5     3
     2    -1
```

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4. Matrix multiplication using for loop

For the given matrices

$$A = \begin{bmatrix} 1 & 3 & 4 \\ 5 & -9 & -8 \\ 4 & 7 & 8 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & 6 & 7 \\ -1 & -5 & 1 \\ 1 & 9 & 0 \end{bmatrix}$$

Find AB.

Algorithm
// Input: Matrix A and B
// Output: Matrix AB

Step1: Input two matrix.

Step2: Define one resultant matrix which is initially contains all 0 of required order

Step 3:

for i from 1 to m_1(iterate through rows of A)
  for j from 1 to m_2 (iterate through columns of B)
    for k from 1 to m_3 (iterate through rows of B)
      element for resultant matrix
      end for
  end for
end for

Solution.

```
A=[1 3 4;5 -9 -8;4 7 8];
B=[1 6 7;-1 -5 1;1 9 0];
[m_1,m_2]=size(A);
[m_3,m_4]=size(B);
R=zeros(m_1,m_4);
if m_2~=m_3
    disp("Multiplication is not posible")
else
    for i=1:m_1
        for j=1:m_4
            for k=1:m_2
                R(i,j)=R(i,j)+ A(i,k)*B(k,j);
            end
        end
    end
end
disp(R)
```

```
     2    27    10
     6     3    26
     5    61    35
```

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