```
%{
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Subject: Assignment Q4
%}

clear all %clear stored variables
clc %clear the screen
close all %close all previously created plots



%A= input('Please enter system Matrix A (equations) along with square
 brackets: ')
%b= input('Please enter system Matrix b (output) along with square
 brackets: ')

A = [3 -1 3 1; 6 0 9 -2; -12 0 -10 5; 72 -8 48 -19]
b = [6; 13; 17; 93]

%Testing if the value of determinent of A is zero
if det(A) == 0
    'The entered system is ill-conditioned, please enter a valid
 system of matrix'
end

%To test the consistency of the matrix
s1 = size (A);
s2 = size (b);
n = s1(1,1); %saving the value of size of A in n (very important)
if s1(1,1) ~= s2(1,1)
    'The system is not consistent, please re-enter the matrix'
end

%Generating and printing the Augmented Matrix
'Augmented matrix'
C=[A b]

index = 0; % The position of the max number in a column, initially
 zero
count=0; % Count of number of times pivoting was done

for c=1:n-1 %columns going from 1 to n

    for h=c:n-1 %Rows going from 'c' to 'n-1' (because once we are
 done with the 1st row and 1st column, we should start with 2nd row
 and column and go upto second last row and column
        %finding the maximum number and its position in the column
        maxNum = max(abs(C(h:n,c)));
        index = find(abs(C(1:n,c)) == maxNum);
```

```
        % Pivoting the row of maximum value with the first row
        C([h index],:)= C([index h],:);
        count=count+1;

        %Now the pivoting is done and the first row is having its
 first value as highest in that column we can do the elimination

        %Performing elimination
        for i= h:(n-1)
            C(i+1,:) = C(i+1,:)- (C(h,:).*(C(i+1,c)/C(h,c)));

        end
        c=c+1; %Incrementing in order to go to the next column

    end
end

'The matrix after Gauss Elimination is'
C %Printing the augmented matrix after elimination

%The matrix is converted into required form and now we can perform
 back
%substitution in order to find the value of variables

x= zeros (n,1); %Creating an array for outputs

%Back Substitution
D = C(:,1:n); %Separating the augmented matrix, first nxn elements in
 a matrix
F = C(:,n+1); % Seaparating the last column in other matrix
x(n) = F(n)/D(n,n); %for the solution of last variable (This is done
 because the calculation required for the last variable is different
 form other variables

%for calculating the value of other variables
for o= n-1:-1:1
    x(o)= (F(o)-D (o,o+1:n)*x(o+1:n))/D(o,o);
end

%Printing the number of times we performed pivoting
'Number of times we performed pivoting'
count

%calculating the error between calculated 'b' and actual 'b'
error= A*x-b

%Printing the output vector
'Output vector is'
x

%Printing the error
'Error in calculation is'
error
```

```
A =

     3    -1     3     1
     6     0     9    -2
   -12     0   -10     5
    72    -8    48   -19


b =

     6
    13
    17
    93


ans =

Augmented matrix


C =

     3    -1     3     1     6
     6     0     9    -2    13
   -12     0   -10     5    17
    72    -8    48   -19    93


ans =

The matrix after Gauss Elimination is


C =

   72.0000   -8.0000   48.0000  -19.0000   93.0000
         0   -1.3333   -2.0000    1.8333   32.5000
         0         0    4.0000    0.5000   21.5000
         0         0         0    0.6250  -24.8750


ans =

Number of times we performed pivoting


count =

     6


error =
```

```
   1.0e-12 *

   -0.0213
         0
         0
   -0.1137


ans =

Output vector is


x =

  -26.6250
  -94.6250
   10.3500
  -39.8000


ans =

Error in calculation is


error =

   1.0e-12 *

   -0.0213
         0
         0
   -0.1137
```

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