```
n = 3;                          % the number of equations
A=[5 2 3; -5 1 2; 4 2 1];     %define the 3x3 matrix A
b=[3;1;1];                      %define the column vector b
B = [A b]                       % 3x4 matrix
L = eye(3)                      % 3x3 identity matrix
P=eye(n)                        %3x3 matrix for permutation matrix P

for k=1:n-1                     % step number (and row to be multipied)
    display('Step')
    k
    %%%%%Partial pivoting strategy
    [t,r]=max(abs(B(k:n,k))); %stores the maximum absolute value of b_{ik}
                           %for i=k,...n
                           %r stores the index of the element t
     %row number is offset by k-1
     r=k-1+r;
     %interchange row (B(k,:)) and row (B(r,:)) of B
     B([k r],:)=B([r k],:);
     %interchange row (P(k,:)) and row (P(r,:)) of P
     P([k r],:)=P([r k],:);
     %interchange L(k,1:k-1) and L(r,1:k-1)
     L([k r],1:k-1)=L([r k],1:k-1);
     %%%%%%%%%end of partial pivoting strategy
     for i=k+1:n %row number to be changed
        L(i,k)=B(i,k)/B(k,k);  % this is the multiplier
        B(i,:)= B(i,:)-L(i,k)*B(k,:)   % row operation
    end
    display('Matrix after the k-th elimination step is ')
    B

end

display('Upper triangular matrix U= ')
U=B(:,1:n) %Upper triangular matrix U

display('Lower triangular matrix L= ')
L %Lower triangular matrix L

display('LU=')
L*U

%perform backward substitution
x=B(:,n+1);
x(n)=B(n,n+1)/B(n,n);
for i=n-1:-1:1
    x(i)=(B(i,n+1)-B(i,i+1:n)*x(i+1:n))/B(i,i);
end
%solution
display('The computed solution is x=')
x
```

```
B =

     5     2     3     3
```

```
    -5     1     2     1
     4     2     1     1


L =

     1     0     0
     0     1     0
     0     0     1


P =

     1     0     0
     0     1     0
     0     0     1

Step

k =

     1


B =

     5     2     3     3
     0     3     5     4
     4     2     1     1


B =

    5.0000    2.0000    3.0000    3.0000
         0    3.0000    5.0000    4.0000
         0    0.4000   -1.4000   -1.4000

Matrix after the k-th elimination step is

B =

    5.0000    2.0000    3.0000    3.0000
         0    3.0000    5.0000    4.0000
         0    0.4000   -1.4000   -1.4000

Step

k =

     2


B =

    5.0000    2.0000    3.0000    3.0000
         0    3.0000    5.0000    4.0000
         0         0   -2.0667   -1.9333
```

```
Matrix after the k-th elimination step is

B =

    5.0000    2.0000    3.0000    3.0000
         0    3.0000    5.0000    4.0000
         0         0   -2.0667   -1.9333

Upper triangular matrix U=

U =

    5.0000    2.0000    3.0000
         0    3.0000    5.0000
         0         0   -2.0667

Lower triangular matrix L=

L =

    1.0000         0         0
   -1.0000    1.0000         0
    0.8000    0.1333    1.0000

LU=

ans =

     5     2     3
    -5     1     2
     4     2     1

The computed solution is x=

x =

    0.1290
   -0.2258
    0.9355
```

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