```
%DualSimplex
clc
clear all
format short
% To solve the LPP by Simplex Method
% Maximize z=-2x1-x3
% Subject to x1+x2-x3>=5
% x1-2x2+4x3>=0
Variables={'x_1','x_2','x_3','s_1','s_2','sol'}
Cost=[-2,0,-1,0,0,0]
Info=[-1,-1,1;-1,2,-4]
b=[-5;-8]
s=eye(size(Info,1))
A=[Info s b]
%% To find the starting BFS
BV=[]
for j=1:size(s,2)
    for i=1:size(A,2)
        if A(:,i)==s(:,j)
            BV=[BV i]
        end
    end
end
fprintf('The Basic Variables (BV)')
disp(Variables(BV))
%% To compute Z-Row(zj-cj)
ZjCj=Cost(BV)*A-Cost
%% To print the table
ZCj=[ZjCj;A]
SimpTable=array2table(ZCj)
SimpTable.Properties.VariableNames(1:size(ZCj,2))=Variables
%% Dual Simplex Starts
Run=true
while  Run
sol=A(:,end)
if any(sol<0)
    fprintf('The current BFS is not Feasible \n')
%% Finding the leaving Variable
[Leaving_Value Pvt_Row]=min(sol)
fprintf('Leaving Row=%d \n',Pvt_Row)
%% Finding the Entering Variable
Row=A(Pvt_Row,1:end-1)
ZRow= ZjCj(:,1:end-1)
for i=1:size(Row,2)
    if Row(i)<0
        ratio(i)=abs(ZRow(i)./Row(i))
    else
        ratio(i)=inf
    end
end
%% to Find the Min ratio
[MinRatio,Pvt_Col]=min(ratio)
fprintf('Entering Variables in %d \n',Pvt_Col)

%% UPDATE THE BASIC VARIABLES
BV(Pvt_Row)=Pvt_Col
fprintf('Basic Variable=')
disp(Variables(BV))
```

```
%pivot key
Pvt_Key=A(Pvt_Row,Pvt_Col)
%Update the Table for the next Iteration
A(Pvt_Row,:)=A(Pvt_Row,:)./Pvt_Key
for i=1:size(A,1)
    if i~=Pvt_Row
    A(i,:)=A(i,:)- A(i,Pvt_Col).*A(Pvt_Row,:);
    end
ZjCj=ZjCj-ZjCj(Pvt_Col).*A(Pvt_Row,:);
%To print the table
ZCj=[ZjCj;A];
SimpTable=array2table(ZCj);
SimpTable.Properties.VariableNames(1:size(ZCj,2))=Variables
end
  else
     Run=false
     fprintf('The current BS is Feasible and Optimal sol \n')
  end
end
%Final Optimal Sol
Final_BFS=zeros(1,size(A,2))
Final_BFS(BV)=A(:,end)
Final_BFS(end)=sum(Final_BFS.*Cost)
OptimalBFS=array2table(Final_BFS)
OptimalBFS.Properties.VariableNames(1:size(OptimalBFS,2))=Variables
```