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Problem :-

Minimization of $Z = -2x - 3y - z$

Subject to :

$$3x + 2y + z \leq 10$$

$$2x + 2y + z \leq 15$$

$$x, y, z \geq 0$$

MATLAB Code for simplex method with output :-

```
%% KHAN MOHD OWAIS RAZA (20BCD7138)
%% Optimization Techniques (MAT2003) Lab-3
% Solving simplex method
%-----%
% Problem:-
% Minimization of: Z = -2x - 3y - z
% Subject to:
% 3x + 2y + z ≤ 10
% 2x + 2y + z ≤ 15
% x, y, z ≥ 0
%-----%
function [ val mat ] = simplex_min(A,C )
A =[1 2 3 4 0 0 0; 0 3 2 1 1 0 10; 0 2 5 3 0 1 15]
C = [0 0 0]
[ na ma] = size(A);
[ nc mc] = size(C);
if nc ~= 1
disp('GIVEN OBJECTIVE FUNCTION SHOULD BE ROW MATRIX')
return
end
if ma-1 ~= mc
disp('CHECK THE GIVEN OBJECTIVE FUNCTION')
return
end
X = [ A(:,1:ma-1) eye(na) A(:,ma) ];
X(na+1,:) = zeros(1,na+ma);
X(na+1,1:mc) = -C;
while sum(X(na+1,1:na+ma-1) > zeros(1,na+ma-1)) ~= 0
xw = X(1:na , 1:na + ma - 1);
[ v1 i1 ] = max(xw);
[ v2 j ] = max(v1);
i = i1(1,j);
Y = X(1:na,na+ma)./X(1:na,j);
```

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a1 = sign(Y);
a1 = a1 + ones(na,1);
y1 = Y.*a1/2;
[ v3 i ] = min(y1);
if v3 == 0
ys = sort(y1);
k = 1;
while ys(k,1) <= 0
k = k + 1;
end
b = ys(k,1);
[ i j1 ] = find( y1 == b );
end
X = elimination(X,i,j);
ele = find(sign(X(na+1,1:na+ma-1))== -1);
[ ne me ] = size(ele);
if me == 0
break
else
j = ele(1,1);
Y = X(1:na,na+ma)./X(1:na,j);
a1 = sign(Y);
a1 = a1 + ones(na,1);
y1 = Y.*a1/2;
[ v3 i ] = min(y1);
if v3 == 0
ys = sort(y1);
k = 1;
while ys(k,1) <= 0
k = k + 1;
end
b = ys(k,1);
[ i j1 ] = find( y1 == b );
X = elimination(X,i,j);
end
end
for k = 1:na+ma-1
un = sign(X(:,k));
if un == - ones(na+1,1)
disp(' The solution is not bounded')
return
end
end
end
opt = X( na+1, ma+na);
sol = X(1:na , 1:ma-1);
for k = 1: ma-1
t = roots( [sol(:,k);0] );
[ nt mt ] = size(t);

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if t == zeros(nt,1)
mat(1,k) = X(na - nt +1, na+ma);
else
mat(1,k) = 0;
end
end
disp('COEFFICIENT OF MATRIX CORRESPOND TO OPTIMAL SOLUTION')
mat
disp('OPTIMAL VALUE IS :')
opt
function X = elimination(X,i,j)
[ nX mX ] = size( X);
a = X(i,j);
X(i,:) = X(i,+)/a;
for k = 1:nX
if k == i
continue
end
X(k,:) = X(k,:) - X(i,)*X(k,j);
end

```

Command Window

```
>> OT_lab3
```

```
A =
```

1	2	3	4	0	0	0
0	3	2	1	1	0	10
0	2	5	3	0	1	15

```
C =
```

0	0	0
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CHECK THE GIVEN OBJECTIVE FUNCTION