MAT2003 (Optimization Techniques) Lab-4

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Topic : Big M method

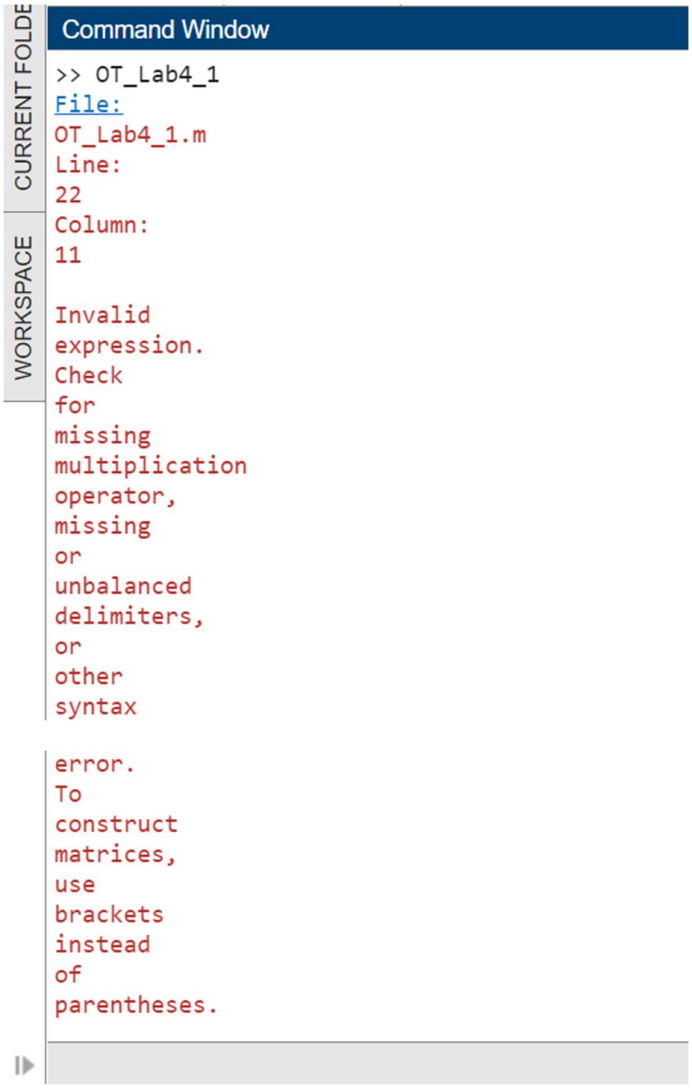
Incorrect Code and errors :-

```
Variables={'x_1','x_2','s_2','s_3','A_1','A_2','Sol'};
M = 100;
Cost = [-14 -13 0 0 -M -M 0];
A = [ 12 11 -1 0 1 0 18;
12 2 0 -1 0 1 110];
s = eye(size(A,1));
BV = [];
for j=1:size(s,2)
for i=1:size(A,2)
if A(:,i)==s(:,j)
BV = [BV i]
end
end
end
Compute Value of Table
B = A(:,BV);
A = inv(B)*A;
ZjCj = Cost(BV)*A-Cost;
Compute Zj-Cj
ZjCj = Cost(BV)*A - Cost;
for Print Table
ZCj=[ZjCj;A];
SimpTable=array2table(ZCj)
SimpTable.Properties.VariableNames(1:size(ZCj,2))=Variables
SIMPLEX METHOD START
RUN = true;
while RUN
%%find the entering variable
ZC = ZjCj(1:end-1);
if any(ZC<0);
fprintf(' The Current BFS is NOT Optimal \n ');
FINDING THE ENTERING VARIABLE
[Entval, pvt_col] = min(ZC);
fprintf('Entering Column = %d \n',pvt_col);

Finding the leaving variable
sol = A(:,end);
Column = A(:,pvt_col);
if all (Column)<=0
fprintf('Solution is UNBOUNDED');
else
Har = find(Column >0);
ratio = inf.*ones(1,length(sol));
ratio(Har)=sol(Har)./Column(Har);
For i=1:size(Column,1)
if column(i)>0
ratio(i)=sol(i)./Column(i);
else
ratio(i)=inf;
end
```

```
end
[MinRatio,pvt_row]=min(ratio);
fprintf(' LEAVING Row = %d \n',pvt_row);
UPDATE THE BV & TABLE
BV(pvt_row)=pvt_col;
B=A(:,bv);
A = inv(B)*A;
ZjCj = Cost(BV)*A - Cost;
for Printing purpose
ZCj=[ZjCj;a];
TABLE = array2table(ZCj);
TABLE.Properties.VariableNames(1:size(ZCj,2)) = Variables
End
Else
RUN = false;
fprintf(' ====== CURRENT BFS IS OPTIMAL====== \n');
end
end

FINAL OPTIMAL SOLUTION PRINT
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
```



Corrected code and output :-

```
%% KHAN MOHD OWAIS RAZA (20BCD7138)
%% Optimization Techniques (MAT2003)
%% Topic: Big-M method
%***** Corrected code *****%
Variables={'x_1','x_2','s_2','s_3','A_1','A_2','Sol'};
M = 100;
Cost = [-14 -13 0 0 -M -M 0];
A = [ 12 11 -1 0 1 0 18;
12 2 0 -1 0 1 110];
s = eye(size(A,1));
BV = [];
for j=1:size(s,2)
for i=1:size(A,2)
if A(:,i)==s(:,j)
BV = [BV i]
end
end
end
B = A(:,BV);
A = inv(B)*A;
ZjCj = Cost(BV)*A-Cost;
ZjCj = Cost(BV)*A - Cost;
ZCj=[ZjCj;A];
SimpTable=array2table(ZCj)
SimpTable.Properties.VariableNames(1:size(ZCj,2))=Variables
RUN = true;
while RUN
ZC = ZjCj(1:end-1);
if any(ZC<0);
fprintf(' The Current BFS is NOT Optimal \n ');
[Entval, pvt_col] = min(ZC);
fprintf('Entering Column = %d \n',pvt_col);
sol = A(:,end);
Column = A(:,pvt_col);
if all (Column)<=0
fprintf('Solution is UNBOUNDED');
else
Har = find(Column >0);
ratio = inf.*ones(1,length(sol));
ratio(Har)=sol(Har)./Column(Har);
for i=1:size(Column,1)
if Column(i)>0
ratio(i)=sol(i)./Column(i);
else
ratio(i)=inf;
end
end
[MinRatio,pvt_row]=min(ratio);
fprintf(' LEAVING Row = %d \n',pvt_row);
BV(pvt_row)=pvt_col;
B=A(:,BV);
A = inv(B)*A;
ZjCj = Cost(BV)*A - Cost;
ZCj=[ZjCj;A];
TABLE = array2table(ZCj);
```

```
TABLE.Properties.VariableNames(1:size(ZCj,2)) = Variables
end
else
RUN = false;
fprintf(' ====== CURRENT BFS IS OPTIMAL====== \n');
end
end
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
```

CURRENT FOLDER

WORKSPACE

Command Window

```
>> OT_Lab4_1

BV =

     5


BV =

     5     6
```

```
SimpTable =

  3×7 table

    ZCj1     ZCj2     ZCj3    ZCj4    ZCj5    ZCj6     ZCj7
    _____    _____    ____    ____    ____    ____    ______

    -2386    -1287    100     100      0       0      -12800
       12       11     -1       0      1       0          18
       12        2      0      -1      0       1         110

SimpTable =

  3×7 table

     x_1      x_2     s_2    s_3    A_1    A_2     Sol
    _____    _____    ___    ___    ___    ___    ______

    -2386    -1287    100    100     0      0     -12800
       12       11     -1      0     1      0         18
       12        2      0     -1     0      1        110

 The Current BFS is NOT Optimal
 Entering Column = 1
 LEAVING Row = 1

TABLE =

  3×7 table

    x_1      x_2         s_2         s_3      A_1         A_2     Sol
    ___    _______    _________    ___    ________    ___    _____

     0      900.17      -98.833    100      198.83     0     -9221
     1     0.91667    -0.083333      0    0.083333     0       1.5
     0          -9            1     -1          -1     1        92
```

```
 The Current BFS is NOT Optimal
 Entering Column = 3
 LEAVING Row = 2

TABLE =

  3×7 table

    x_1      x_2      s_2       s_3       A_1      A_2         Sol
    ___    _______    ___    _________    ___    ________    _______

     0      10.667     0        1.1667    100      98.833    -128.33
     1     0.16667     0     -0.083333      0    0.083333     9.1667
     0          -9     1            -1     -1           1         92

 ====== CURRENT BFS IS OPTIMAL======

OptimalBFS =

  1×7 table

     x_1      x_2    s_2    s_3    A_1    A_2      Sol
    ______    ___    ___    ___    ___    ___    _______

    9.1667     0     92      0      0      0     -128.33

>>
```