Table of Contents


```
clear all
close all
syms  x1 x2 [20 4]
syms x1_flat x2_flat c_flat w_flat X_min [1 80]
X = [x1;x2];
```

Setup LP

```
W = readmatrix('Exp_Score.csv');
C = readmatrix('Cost.csv');

W_flat = reshape(W,1,[]);
C_flat = reshape(C,1,[]);



f = -sum((0.9*W_flat.*x1_flat+0.1*W_flat.*x2_flat),'all');
budget = 100;
numgoalkeepers = 2;
numdefenders = 5;
nummidfielders = 5;
numforwards = 3;
numplayers = 15;
numstarters = 11;

minstartingdefenders = 3;
minstartingmidfielders = 2;
minstartingforwards = 3;
numstartinggoalkeepers = 1;

g1 = sum(x1_flat.*C_flat + x2_flat.*C_flat)-budget;
h1 = sum(x1_flat)+sum(x2_flat)-numplayers;
h2 = sum(x1_flat, 'all')-numstarters;
h3 = sum(x1_flat(20*0+1:20*0+20))+sum(x2_flat(20*0+1:20*0+20))-
numgoalkeepers;
h4 = sum(x1_flat(20*1+1:20*1+20))+sum(x2_flat(20*1+1:20*1+20))-
numdefenders;
h5 = sum(x1_flat(20*2+1:20*2+20))+sum(x2_flat(20*2+1:20*2+20))-
nummidfielders;
h6 = sum(x1_flat(20*3+1:20*3+20))+sum(x2_flat(20*3+1:20*3+20))-
numforwards;
h7 = sum(x1_flat(20*0+1:20*0+20))-numstartinggoalkeepers;
```

```
g2 = sum(x1_flat(20*1+1:20*1+20))-numdefenders;
g3 = -sum(x1_flat(20*1+1:20*1+20))+minstartingdefenders;
g4 = sum(x1_flat(20*2+1:20*2+20))-nummidfielders;
g5 = -sum(x1_flat(20*2+1:20*2+20))+minstartingmidfielders;
g6 = sum(x1_flat(20*3+1:20*3+20))-numforwards;
g7 = -sum(x1_flat(20*3+1:20*3+20))+minstartingforwards;

for i = 1:20
gplayerlims(i) = sum(x1_flat([i,20+i,40+i,60+i]))-3;
end


g= [g1;g2;g3;g4;g5;g6;g7;gplayerlims'];
h = [h1;h2;h3;h4;h5;h6;h7];


 F =  matlabFunction(f,'vars',{[x1_flat,x2_flat]});
 G = matlabFunction(g,'vars',{[x1_flat,x2_flat]});
 H = matlabFunction(h,'vars',{[x1_flat,x2_flat]});

 nonlinfc= @(in1)deal(G(in1),H(in1));
```

Run Different Scenarios

```
 x0 = [zeros([20,4]); zeros( [20,4])];
 opts = optimset('Algorithm','sqp','Display','off');

 runfmincon(F,x0, nonlinfc, opts);

  x0 = [zeros([20,4]); zeros( [20,4])];
 opts = optimset('Algorithm','active-set','Display','off');


 runfmincon(F,x0, nonlinfc, opts);



  x0 = [zeros([20,4]); zeros( [20,4])];
 opts = optimset('Algorithm','interior-point','Display','off');

 runfmincon(F,x0, nonlinfc, opts);

  x0 = [ones([20,4]); ones( [20,4])];
 opts = optimset('Algorithm','sqp','Display','off');

 runfmincon(F,x0, nonlinfc, opts);

  x0 = [ones([20,4]); ones( [20,4])];
 opts = optimset('Algorithm','active-set','Display','off');


 runfmincon(F,x0, nonlinfc, opts);
```

```
 x0 = [ones([20,4]); ones( [20,4])];
opts = optimset('Algorithm','interior-point','Display','off');
x0_flat = reshape(x0,1,[]);

runfmincon(F,x0_flat, nonlinfc, opts);
```

```
  x0 = [zeros([20,4]); zeros( [20,4])];
opts = optimset('Algorithm','sqp','Display','off','MaxFunEvals',inf);
runfmincon(F,x0, nonlinfc, opts);
   x0 = [zeros([20,4]); zeros( [20,4])];
opts = optimset('Algorithm','active-
set','Display','off','MaxFunEvals',inf);
runfmincon(F,x0, nonlinfc, opts);
  x0 = [zeros([20,4]); zeros( [20,4])];
opts = optimset('Algorithm','interior-
point','Display','off','MaxFunEvals',inf);
runfmincon(F,x0, nonlinfc, opts);
```

NLP

```
W = readmatrix('Exp_Score_nlp.csv');
W_flat = reshape(W,1,[]);
```

```
f = -sum((X_min.*W_flat.*x1_flat+X_min.*W_flat.*x2_flat),'all');
```

Runfmincon function

```
function [x fval] = runfmincon(F,x0, nonlinfc, opts)
 x0_flat = reshape(x0,1,[]);
[x fval] = fmincon(F,x0_flat,[],[],[],[],...
   zeros(1,160),[],...
   nonlinfc,opts);
disp('-------------------------------------------------------');
disp([ 'Algorithm:', opts.Algorithm]);
disp('x0');
table(x0)
disp (['Fval = ' ,num2str(fval)]);
```

```
x1_out = x(1:80);
x2_out = x(81:160);
x1_out=reshape(x1_out,20,[]);
x1_out(x1_out<1E-5) = 0;
table(x1_out)
```

```
x2_out=reshape(x2_out,20,[]);
x2_out(x2_out<1E-5) = 0;
table(x2_out)

 end


% f_new = double(subs(f,{x1_flat,reshape(x1_out,1,[])))

-----------------------------------------------------
Algorithm:sqp
x0

ans =

  40×1 table

         x0
    ________________

    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
```

```
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0

Fval = -55.3593

ans =

  20×1 table

                        x1_out
    ____________________________________________

           0           0           0           0
           0           0           0           0
           0           0           0           0
           0     0.51573      2.4843           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
    0.056997      1.7488           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0     0.73551      1.5157     0.74688
     0.74688           0           0      2.2531
     0.19612           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0

ans =

  20×1 table

                        x2_out
    ____________________________________________

           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           2    5.1414e-05           0
     0.92541           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
```

```
           0             0             0             0
           0             0             0             0
           0             0             0             0
           0             0             0             0
           0             0             0             0
           0             0             0             0
           0             0             0             0
           0             0             0             0
    0.074588             0       0.99995             0
           0             0             0             0
           0             0             0             0
           0             0             0             0

-----------------------------------------------------
Algorithm:active-set
x0

ans =

  40×1 table

         x0
    ________________

    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
```

```
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0

Fval = -55.0507

ans =

  20×1 table

                        x1_out
    ____________________________________________________

          0            0            0            0
          0            0            0            0
          0            0            0            0
          0      0.59427       2.4057            0
          0            0            0            0
          0            0    0.0036256            0
          0            0            0            0
    0.39975       2.0829     0.070664            0
          0            0            0            0
          0            0     0.017356            0
          0            0    0.0017625            0
          0            0            0            0
          0            0            0            0
          0            0            0            0
          0      0.32286       1.2952       1.2985
    0.32991            0      0.20414        1.532
    0.27034            0            0            0
          0            0    0.0015515      0.16949
          0            0            0            0
          0            0            0            0


ans =

  20×1 table

                        x2_out
    ____________________________________________________

          0            0            0            0
    0.22331            0            0            0
  0.0084088            0            0            0
   0.037274       0.8232        0.874            0
   0.013496            0            0            0
```

```
     0.38883           0           0           0
           0           0           0           0
   0.0023651      1.0848           0           0
           0           0           0           0
    0.056458           0           0           0
     0.05248           0           0           0
           0           0           0           0
           0           0           0           0
    0.022362           0           0           0
   0.0022042           0           0           0
           0           0           0           0
     0.19049           0       0.126           0
           0     0.09203           0           0
   0.0023198           0           0           0
           0           0           0           0

Warning: Matrix is close to singular or badly scaled. Results
may be inaccurate. RCOND =  1.616751e-16.
Warning: Matrix is close to singular or badly scaled. Results
may be inaccurate. RCOND =  5.874405e-17.
Warning: Matrix is close to singular or badly scaled. Results
may be inaccurate. RCOND =  2.638165e-17.
Warning: Matrix is close to singular or badly scaled. Results
may be inaccurate. RCOND =  1.281899e-16.
-----------------------------------------------------
Algorithm:interior-point
x0

ans =

  40×1 table

         x0
    ________________

    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
```

```
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0

Fval = -53.4074

ans =

  20×1 table

                        x1_out
    ____________________________________________

    0.024353    0.0091342     0.017951    0.0096607
    0.049055     0.021229     0.023337     0.018309
     0.05831     0.020386     0.027908     0.015557
    0.019711       1.3884       1.5646     0.011345
    0.046163     0.024714     0.023537     0.021582
    0.047795     0.011699     0.033367     0.025937
    0.041706     0.025033     0.018189     0.025892
     0.11057       0.7443      0.30676     0.022177
    0.046577      0.02658     0.037359     0.013839
    0.068217     0.021635     0.036252     0.014644
    0.031103     0.015204     0.023553     0.014445
    0.022152    0.0084472     0.012541    0.0088919
    0.026707     0.012313     0.017429      0.01244
     0.02737     0.014033     0.018269     0.011896
    0.083521      0.59333       1.1605       0.4216
    0.079922     0.022876      0.44579       2.2336
    0.090982     0.037954     0.043351      0.02295
     0.05974      0.05317     0.066445     0.068948
    0.025246     0.010924     0.015576     0.010949
    0.040813     0.020093     0.025849     0.015382


ans =
```

```
  20×1 table

                        x2_out
    ____________________________________________________

    0.046178     0.05655    0.047716           0
    0.053278    0.096298    0.053997           0
    0.052399    0.087505    0.054465           0
     0.05536     0.32104    0.069608           0
    0.054167    0.099147    0.051759           0
     0.05279    0.016623    0.057691           0
    0.046862     0.10067    0.049466           0
    0.046566     0.12759    0.059761           0
    0.049646    0.098225    0.056198           0
    0.054835    0.096923    0.056454           0
    0.049487    0.081775    0.055787           0
    0.043892    0.052566     0.04429           0
    0.045597    0.070205    0.049277           0
    0.045805    0.071101    0.047692           0
    0.047014     0.11519    0.057961           0
    0.053537    0.025588    0.053729           0
    0.055391     0.11937    0.059307           0
    0.048715     0.12619    0.055412           0
    0.049672    0.065768    0.047766           0
    0.048818    0.090274    0.053087           0

----------------------------------------------------
Algorithm:sqp
x0

ans =

  40×1 table

          x0
    ________________

    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
```

```
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1
    1     1     1     1

Fval = -55.2788

ans =

  20×1 table

                        x1_out
    ____________________________________________

           0            0            0            0
           0            0            0            0
           0            0            0            0
           0       0.9359       2.0641            0
           0            0            0            0
           0            0            0            0
           0            0            0            0
    0.098018       1.4409            0            0
           0            0            0            0
           0            0            0            0
           0            0            0            0
           0            0            0            0
           0            0            0            0
           0            0            0            0
           0      0.62315       1.7248      0.65201
      0.4409            0      0.21111        2.348
     0.46108            0            0            0
           0            0            0            0
           0            0            0            0
           0            0            0            0
```

```
ans =

  20×1 table

                    x2_out
    ___________________________________________

    0              0    0.00019847             0
    0              0     0.0032832             0
    0              0     0.0090458             0
    0              2             0             0
    1              0             0             0
    0              0      0.053276             0
    0              0             0             0
    0              0             0             0
    0              0             0             0
    0              0             0             0
    0              0             0             0
    0              0             0             0
    0              0             0             0
    0              0             0             0
    0              0             0             0
    0              0             0             0
    0              0        0.9342             0
    0              0             0             0
    0              0             0             0
    0              0             0             0

------------------------------------------------------
Algorithm:active-set
x0

ans =

  40×1 table

          x0
    ________________

    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
    1    1    1    1
```

```
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1

Fval = -55.2301

ans =

  20×1 table

                          x1_out
    ____________________________________________________

            0             0             0             0
            0             0             0             0
            0             0             0             0
            0       0.57058        2.4294             0
            0             0             0             0
            0             0             0             0
            0             0             0             0
      0.48127        1.5184             0             0
            0             0             0             0
            0             0             0             0
            0             0             0             0
            0             0             0             0
            0             0             0             0
            0             0             0             0
            0       0.91101        1.1787       0.91028
      0.51841             0       0.39187        2.0897
   0.00031806             0             0             0
```

```
            0            0            0            0
            0            0            0            0
            0            0            0            0


ans =

  20×1 table

                        x2_out
    ____________________________________________________

            0            0            0            0
    3.6201e-05            0    0.0014385            0
            0            0    0.00022036           0
            0       1.3036       0.19629           0
     0.0038683            0            0           0
     0.0020771            0            0           0
            0            0            0           0
            0            0            0           0
            0            0            0           0
        0.4316           0            0           0
    0.00043604           0            0           0
            0            0            0           0
            0            0            0           0
            0            0            0           0
            0            0            0           0
    0.00017256           0            0           0
       0.56181           0      0.80206           0
            0      0.69639            0           0
            0            0            0           0
            0            0            0           0

Warning: Matrix is close to singular or badly scaled. Results
may be inaccurate. RCOND =  9.665792e-17.
Warning: Matrix is close to singular or badly scaled. Results
may be inaccurate. RCOND =  6.576710e-17.
------------------------------------------------------
Algorithm:interior-point
x0

ans =

  table

          x0
    ______________

    [1×160 double]

Fval = -53.2596

ans =
```

20×1 table

x1_out
0.023873
0.047516
0.056336
0.030838
0.044682
0.046351
0.040838
0.11091
0.045396
0.065088
0.030363
0.021705
0.026275
0.026891
0.070773
0.10495
0.085244
0.057444
0.024675
0.039864

ans =

20×1 table

x2_out
0.046095
0.052999
0.052301
0.055957
0.053752
0.052547
0.04707
0.047072
0.049687
0.054566
0.049283
0.043935
0.04564
0.045848
0.047457
0.053573
0.055177
0.048936
0.04926
0.048859

x1_out	x2_out
0.0094633	0.05421
0.02305	0.087183
0.022094	0.080133
0.7819	0.46149
0.027353	0.089939
0.012689	0.016522
0.027749	0.091213
0.89893	0.12628
0.029777	0.089406
0.023545	0.087735
0.016125	0.075101
0.0087391	0.050722
0.012916	0.065747
0.014857	0.066622
0.96239	0.11161
0.029668	0.024937
0.045561	0.10913
0.07024	0.11756
0.011377	0.062033
0.021723	0.0823

x1_out	x2_out
0.01662	0.046417
0.021162	0.052138
0.024956	0.052714
2.1502	0.068416
0.021373	0.050211
0.029345	0.05565
0.01683	0.047956
0.081826	0.058151
0.032541	0.054444
0.03166	0.054645
0.021303	0.053677
0.011861	0.043006
0.016208	0.047744
0.01694	0.046415
0.97493	0.056746
0.35439	0.052769
0.037028	0.057241
0.052913	0.054049
0.014536	0.046298
0.023265	0.051451

x1_out	x2_out
0.011362	0
0.02503	0
0.020275	0
0.017379	0
0.031443	0
0.042961	0
0.042276	0
0.033909	0
0.017513	0
0.018671	0
0.018308	0
0.010279	0
0.015231	0
0.014554	0
0.65848	0
1.5711	0
0.034659	0
0.38369	0
0.013015	0
0.019888	0

```
-----------------------------------------------------
Algorithm:sqp
x0

ans =

  40×1 table

         x0
    ________________

    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0

Fval = -55.3593
```

```
ans =

  20×1 table

                    x1_out
    ____________________________________________

           0           0           0           0
           0           0           0           0
           0           0           0           0
           0     0.51573      2.4843           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
    0.056997      1.7488           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0     0.73551      1.5157     0.74688
     0.74688           0           0      2.2531
     0.19612           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0

ans =

  20×1 table

                    x2_out
    ____________________________________________

           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           2   5.1414e-05           0
     0.92541           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
           0           0           0           0
    0.074588           0     0.99995           0
```

```
             0             0             0             0
             0             0             0             0
             0             0             0             0

-----------------------------------------------------
Algorithm:active-set
x0

ans =

  40×1 table

           x0         
    ________________

    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
```

```
    0    0    0    0

Fval = -55.1039

ans =

  20×1 table

                          x1_out
    ____________________________________________________

            0             0             0             0
            0             0             0             0
    1.1523e-05            0             0             0
    1.3463e-05       0.58528        2.4147             0
            0             0    1.1678e-05             0
            0             0    0.00017992             0
    1.2143e-05            0             0             0
       0.34743        2.0767      0.044615             0
            0             0             0             0
    1.5145e-05            0             0             0
    1.9777e-05            0             0             0
            0             0             0             0
    2.9505e-05            0             0             0
            0             0             0             0
    3.2592e-05       0.33806        1.2938        1.3045
       0.57853             0       0.24663        1.5465
      0.073787             0             0             0
    4.0705e-05             0    1.9125e-05       0.14907
            0             0             0             0
    7.8183e-05             0             0             0


ans =

  20×1 table

                          x2_out
    ____________________________________________________

     0.0003064             0    1.8248e-05             0
       0.44552             0             0             0
     0.0004957             0    0.00028054             0
    0.00052429       0.91707       0.87106             0
       0.13545             0             0             0
            0             0             0             0
    9.2467e-05             0             0             0
    0.00027875        1.0829             0             0
    2.7283e-05             0             0             0
      0.093424             0             0             0
    0.00018854             0             0             0
    7.8091e-05             0             0             0
    0.00028435             0             0             0
            0             0             0             0
```

```
           0               0               0               0
  0.00059897               0               0               0
     0.32116               0         0.12863               0
   0.0012215               0               0               0
  0.00021402               0               0               0
  0.00014355               0               0               0

Warning: Matrix is close to singular or badly scaled. Results
may be inaccurate. RCOND =  1.616751e-16.
Warning: Matrix is close to singular or badly scaled. Results
may be inaccurate. RCOND =  5.874405e-17.
Warning: Matrix is close to singular or badly scaled. Results
may be inaccurate. RCOND =  2.638165e-17.
Warning: Matrix is close to singular or badly scaled. Results
may be inaccurate. RCOND =  1.281899e-16.
Warning: Matrix is singular to working precision.
-----------------------------------------------------
Algorithm:interior-point
x0

ans =

  40×1 table

         x0
    ________________

    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
```

```
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0

Fval = -54.6403

ans =

  20×1 table

                        x1_out
    ____________________________________________

    0.0061064    0.0019023    0.0038538     0.001797
     0.015163    0.0047286     0.005243    0.0036397
     0.018992    0.0044291    0.0062287    0.0029538
    0.0002011       1.1179       1.8766    0.0021635
     0.014641    0.0055549    0.0051653    0.0045293
     0.014458    0.0015809    0.0075863    0.0053795
     0.010754    0.0056524    0.0039726    0.0054904
      0.18687       1.6483       0.6589    0.0036978
     0.012779    0.0059683    0.0081341    0.0025818
     0.065864     0.004827    0.0079859    0.0029141
     0.008469    0.0032898    0.0053731    0.0029582
    0.0053804    0.0017472    0.0026902    0.0017337
    0.0066722     0.002611     0.003808    0.0025337
    0.0068745    0.0029582    0.0039198    0.0022315
     0.067707      0.15857        1.068      0.43468
      0.13098    0.0030517      0.30965       2.5042
      0.39588     0.009465    0.0091088    0.0047115
     0.014346      0.01451    0.0010004    0.0065179
    0.0067103    0.0023056    0.0033813    0.0022278
     0.011153    0.0044032    0.0057137    0.0030383


ans =

  20×1 table

                        x2_out
    ____________________________________________

    0.034786      0.01752     0.031909            0
    0.078147     0.083732     0.065502            0
```

```
0.058342     0.035228     0.057614           0
0.037252      0.85748     0.033765           0
 0.10062     0.075946      0.04393           0
0.071549    0.0020302     0.086117           0
0.028042     0.087123     0.040755           0
0.021675      0.07092      0.05253           0
0.040022     0.057273     0.059071           0
0.089422     0.085201     0.063283           0
0.051141     0.041188     0.092933           0
0.026452     0.015366     0.029524           0
0.029691     0.024853     0.041701           0
0.030123     0.021824     0.031215           0
0.023427      0.02781     0.033151           0
0.055593     0.003219     0.024766           0
0.088049      0.20677     0.090685           0
0.031556      0.21142     0.037968           0
0.066581     0.022994       0.0379           0
0.037529     0.048357     0.049436           0
```

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