Pràctica 2, Programació Matemàtica: Algorisme del símplex

Camelia Brumar (X8562628G)
Leonor Lamsdorff-Galagane (26065525Q)

21 Novembre 2017

1 Descripció de la implementació

Per implementar l'algorisme del símplex (d'ara en endavant AS) hem usat OCTAVE. El model de AS que hem triat integra en un sol script la fase I i II del símplex (fitxer `simplexP.m`), és a dir, que comença creant i solucionant el problema de la fase I (primera opció presentada a l'enunciat). Quan ha arribat a la solució, determina si el problema inicial era infactible, i en cas afirmatiu passa a la fase II. Allà, a cada iteració pot detectar si el problema és il·limitat, perquè té un condicional que comprova min $d_b \geq 0$.

El que sí s'ha programat per separat és una iteració aïllada del símplex, que corresponen als arxius `simplexP_iterBland.m` i `simplexP_iterCRMN.m`. Respecte això, és important comentar que posat que hem implementat la regla de Bland, si el problema fos degenerat l'AS convergiria igualment (sempre que no fos il·limitat), mentre que amb la regla dels costos reduïts més negatius això no tindria per què passar (no impedeix el ciclat).

En resum, la nostra implementació de l'AS té la següent forma:

Data: Fitxers 11 i 33
Result: (Una) $z*$ si $\exists$. Si $\nexists$, indica si és il·limitat o infactible.
Inicialitzacions de les dades de la Fase I;
while ***not*** *soluciónF1 trobada* **do**
  iteració_simplex(paràmetres de la F1);
end
if *soluciónF1* > 0 **then**
  acaba;
else
  inicialitza les dades de la Fase II;
  while ***not*** *soluciónF2 trobada* ***or not*** *detecta problema il·limitat* **do**
    iteració_simplex(paràmetres de la F2);
  end
end

2 Execució del programa

Els nostres codis de conjunts de dades són 11 i 33.

2.1 Execució de l'11 amb regla de Bland

```
-----CONJUNT DE DADES 11, PL 1, REGLA DE BLAND-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 1, B(p) = 30, theta* = 0.38144, z = 3212.8866
  Iteracio 2    iout = 0, q = 2, B(p) = 28, theta* = 2.74, z = 2143.3679
  Iteracio 3    iout = 0, q = 5, B(p) = 26, theta* = 0.2021, z = 2063.8974
  Iteracio 4    iout = 0, q = 3, B(p) = 1, theta* = 0.19303, z = 1905.7555
  Iteracio 5    iout = 0, q = 4, B(p) = 3, theta* = 0.37467, z = 1873.002
  Iteracio 6    iout = 0, q = 9, B(p) = 29, theta* = 0.10357, z = 1770.2156
  Iteracio 7    iout = 0, q = 8, B(p) = 22, theta* = 2.0288, z = 1226.6727
  Iteracio 8    iout = 0, q = 10, B(p) = 21, theta* = 0.77478, z = 1017.8422
  Iteracio 9    iout = 0, q = 7, B(p) = 9, theta* = 1.5951, z = 952.2646
  Iteracio 10    iout = 0, q = 11, B(p) = 4, theta* = 0.22692, z = 846.5493
  Iteracio 11    iout = 0, q = 9, B(p) = 24, theta* = 1.9682, z = 176.2754
  Iteracio 12    iout = 0, q = 4, B(p) = 25, theta* = 0.063813, z = 75.9517
  Iteracio 13    iout = 0, q = 1, B(p) = 23, theta* = 0.1935, z = 70.3997
  Iteracio 14    iout = 0, q = 3, B(p) = 1, theta* = 0.029486, z = 46.6528
  Iteracio 15    iout = 0, q = 6, B(p) = 2, theta* = 0.2747, z = 36.9837
  Iteracio 16    iout = 0, q = 13, B(p) = 4, theta* = 0.29911, z = 14.5881
  Iteracio 17    iout = 0, q = 2, B(p) = 6, theta* = 0.84168, z = 14.5262
  Iteracio 18    iout = 0, q = 12, B(p) = 27, theta* = 0.23066, z = 0
  Iteracio 19    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
Solucio basica factible de fase I trobada, iteracio 19
Simplex Fase II
  Iteracio 1    iout = 0, q = 6, B(p) = 2, theta* = 0.36524, z = -57.9199
  Iteracio 2    iout = 0, q = 14, B(p) = 10, theta* = 0.029663, z = -76.4343
  Iteracio 3    iout = 0, q = 1, B(p) = 12, theta* = 0.064603, z = -86.9666
  Iteracio 4    iout = 0, q = 4, B(p) = 13, theta* = 0.34824, z = -98.6296
  Iteracio 5    iout = 0, q = 10, B(p) = 5, theta* = 0.46107, z = -268.0526
  Iteracio 6    iout = 0, q = 2, B(p) = 7, theta* = 0.8799, z = -280.5504
  Iteracio 7    iout = 0, q = 13, B(p) = 8, theta* = 1.5136, z = -329.2738
  Iteracio 8    iout = 0, q = 7, B(p) = 4, theta* = 0.88949, z = -335.5557
  Iteracio 9    iout = 0, q = 16, B(p) = 10, theta* = 227.0763, z = -555.6034
  Iteracio 10    iout = 0, q = 12, B(p) = 11, theta* = 1.595, z = -591.0942
  Iteracio 11    iout = 0, q = 18, B(p) = 3, theta* = 89.2035, z = -715.9426
  Iteracio 12    iout = 0, q = 10, B(p) = 7, theta* = 0.067706, z = -835.7955
  Iteracio 13    iout = 0, q = 8, B(p) = 13, theta* = 0.3459, z = -836.2593
  Iteracio 14    iout = 0, q = 11, B(p) = 12, theta* = 0.11136, z = -843.1821
  Iteracio 15    iout = 0, q = 13, B(p) = 10, theta* = 0.086767, z = -843.7283
  Iteracio 16    iout = 0, q = 17, B(p) = 13, theta* = 1.9925, z = -844.8043
  Iteracio 17    iout = 0,1 q = 12, B(p) = 11, theta* = 0.11969, z = -846.555
  Iteracio 18    iout = 0, q = 19, B(p) = 8, theta* = 20.2262, z = -847.1681
```

```
  Iteracio 19    iout = 2, q = 0, B(p) = 0, theta* = 0, z = -847.1681
Solucio basica factible trobada, iteracio 19
vb =

   14   19   18    9   17   16    1    6    2   12

xb =

     1.180    20.226   183.537     2.722     3.922
     468.294     3.342     1.310     4.969     0.126

z = -847.168
rq =

    17.485   124.487   247.563    73.596     0.743
    147.875    12.295   117.068     1.656     0.401

-----CONJUNT DE DADES 11, PL 2, REGLA DE BLAND-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 1, B(p) = 22, theta* = 0.48485, z = 2849.3939
  Iteracio 2    iout = 0, q = 2, B(p) = 29, theta* = 0.92615, z = 2744.1781
  Iteracio 3    iout = 0, q = 3, B(p) = 23, theta* = 1.0953, z = 2665.6647
  Iteracio 4    iout = 0, q = 4, B(p) = 1, theta* = 0.050161, z = 2649.3003
  Iteracio 5    iout = 0, q = 7, B(p) = 4, theta* = 0.065349, z = 2645.989
  Iteracio 6    iout = 0, q = 10, B(p) = 7, theta* = 0.18747, z = 2629.0085
  Iteracio 7    iout = 0, q = 11, B(p) = 21, theta* = 0.17436, z = 2041.0312
  Iteracio 8    iout = 0, q = 1, B(p) = 27, theta* = 1.6598, z = 1816.5426
  Iteracio 9    iout = 0, q = 4, B(p) = 26, theta* = 2.1905, z = 1173.1555
  Iteracio 10    iout = 0, q = 5, B(p) = 1, theta* = 0.46876, z = 1084.4889
  Iteracio 11    iout = 0, q = 6, B(p) = 24, theta* = 0.40262, z = 921.2332
  Iteracio 12    iout = 0, q = 7, B(p) = 28, theta* = 0.64436, z = 282.5643
  Iteracio 13    iout = 0, q = 8, B(p) = 30, theta* = 1.3306, z = 125.5421
  Iteracio 14    iout = 0, q = 9, B(p) = 6, theta* = 0.7876, z = 94.1334
  Iteracio 15    iout = 0, q = 12, B(p) = 25, theta* = 0.75091, z = 0
  Iteracio 16    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
Solucio basica factible de fase I trobada, iteracio 16
Simplex Fase II
  Iteracio 1    iout = 0, q = 14, B(p) = 12, theta* = 0.2489, z = -51.3835
  Iteracio 2    iout = 0, q = 13, B(p) = 5, theta* = 0.54263, z = -55.1579
  Iteracio 3    iout = 0, q = 15, B(p) = 10, theta* = 139.6093, z = -68.1202
  Iteracio 4    iout = 0, q = 5, B(p) = 14, theta* = 0.023059, z = -68.4269
  Iteracio 5    iout = 0, q = 16, B(p) = 9, theta* = 186.8374, z = -118.3015
  Iteracio 6    iout = 0, q = 14, B(p) = 8, theta* = 0.2726, z = -134.5223
  Iteracio 7    iout = 0, q = 9, B(p) = 2, theta* = 0.029119, z = -134.6277
  Iteracio 8    iout = 0, q = 17, B(p) = 11, theta* = 35.165, z = -138.0872
  Iteracio 9    iout = 0, q = 2, B(p) = 13, theta* = 2.3455, z = -157.5315
  Iteracio 10    iout = 2, q = 0, B(p) = 0, theta* = 0, z = -157.5315
Solucio basica factible trobada, iteracio 10
```

```
vb =

   17   15    3   16    5    4    2    7    9   14

xb =

   556.647    79.254     1.094    46.491     0.956
   1.458     2.345     3.548     0.796     1.746

z = -157.532
rq =

   160.107    55.172    28.334    50.412    18.175
   7.926    10.997     0.938     0.629     0.842

-----CONJUNT DE DADES 11, PL 3, REGLA DE BLAND-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 1, B(p) = 30, theta* = 0.62338, z = 725.6623
  Iteracio 2    iout = 0, q = 2, B(p) = 29, theta* = 0.015848, z = 720.3794
  Iteracio 3    iout = 0, q = 6, B(p) = 21, theta* = 0.071854, z = 716.3217
  Iteracio 4    iout = 0, q = 9, B(p) = 2, theta* = 0.041615, z = 715.0163
  Iteracio 5    iout = 0, q = 16, B(p) = 26, theta* = 124.1536, z = 590.8627
  Iteracio 6    iout = 0, q = 7, B(p) = 28, theta* = 0.14403, z = 589.2968
  Iteracio 7    iout = 0, q = 12, B(p) = 7, theta* = 0.17151, z = 583.5399
  Iteracio 8    iout = 0, q = 2, B(p) = 9, theta* = 0.035717, z = 583.5172
  Iteracio 9    iout = 0, q = 18, B(p) = 12, theta* = 13.4604, z = 578.5593
  Iteracio 10    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 578.5593
Solucio basica factible de fase I trobada, iteracio 10
El problema original es infactible.

-----CONJUNT DE DADES 11, PL 4, REGLA DE BLAND-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 1, B(p) = 28, theta* = 8.4681, z = 3523.383
  Iteracio 2    iout = 0, q = 2, B(p) = 26, theta* = 5.7171, z = 2004.6952
  Iteracio 3    iout = 0, q = 3, B(p) = 29, theta* = 1.6224, z = 1646.3342
  Iteracio 4    iout = 0, q = 4, B(p) = 3, theta* = 3.5111, z = 1457.5137
  Iteracio 5    iout = 0, q = 5, B(p) = 25, theta* = 2.3639, z = 1278.6388
  Iteracio 6    iout = 0, q = 6, B(p) = 33, theta* = 0.3482, z = 1155.1332
  Iteracio 7    iout = 0, q = 3, B(p) = 30, theta* = 0.36603, z = 1057.568
  Iteracio 8    iout = 0, q = 7, B(p) = 27, theta* = 0.37917, z = 941.487
  Iteracio 9    iout = 0, q = 8, B(p) = 1, theta* = 1.243, z = 228.8981
  Iteracio 10    iout = 0, q = 12, B(p) = 34, theta* = 0.28468, z = 179.9406
  Iteracio 11    iout = 0, q = 10, B(p) = 4, theta* = 0.31302, z = 177.3293
  Iteracio 12    iout = 0, q = 11, B(p) = 32, theta* = 1.52, z = 56.5262
  Iteracio 13    iout = 0, q = 4, B(p) = 10, theta* = 1.2997, z = 26.8622
  Iteracio 14    iout = 0, q = 13, B(p) = 31, theta* = 0.25597, z = 0
```

```
  Iteracio 15    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
Solucio basica factible de fase I trobada, iteracio 15
Simplex Fase II
  Iteracio 1    iout = 0, q = 1, B(p) = 3, theta* = 0.56569, z = -929.9068
  Iteracio 2    iout = 0, q = 15, B(p) = 13, theta* = 50.7218, z = -977.4781
  Iteracio 3    iout = 0, q = 16, B(p) = 1, theta* = 4.3752, z = -978.2728
  Iteracio 4    iout = 0, q = 17, B(p) = 16, theta* = 1.5301, z = -979.3598
  Iteracio 5    iout = 0, q = 13, B(p) = 15, theta* = 0.92777, z = -1029.5539
  Iteracio 6    iout = 0, q = 14, B(p) = 8, theta* = 0.45942, z = -1072.7406
  Iteracio 7    iout = 0, q = 10, B(p) = 12, theta* = 0.27856, z = -1092.7377
  Iteracio 8    iout = 0, q = 16, B(p) = 10, theta* = 22.8513, z = -1111.8363
  Iteracio 9    iout = 0, q = 8, B(p) = 14, theta* = 0.53067, z = -1115.9739
  Iteracio 10    iout = 0, q = 18, B(p) = 8, theta* = 26.7564, z = -1167.6621
  Iteracio 11    iout = 0, q = 20, B(p) = 2, theta* = 136.6629, z = -1231.8382
  Iteracio 12    iout = 0, q = 19, B(p) = 18, theta* = 13.3908, z = -1235.5321
  Iteracio 13    iout = 0, q = 21, B(p) = 7, theta* = 65.4613, z = -1287.4449
  Iteracio 14    iout = 0, q = 15, B(p) = 4, theta* = 335.9906, z = -1298.6894
  Iteracio 15    iout = 0, q = 18, B(p) = 6, theta* = 99.3183, z = -1435.6649
  Iteracio 16    iout = 0, q = 4, B(p) = 16, theta* = 4.5949, z = -1473.968
  Iteracio 17    iout = 0, q = 23, B(p) = 13, theta* = 721.6105, z = -1994.4468
  Iteracio 18    iout = 0, q = 16, B(p) = 4, theta* = 1136.8169, z = -2449.5288
  Iteracio 19    iout = 0, q = 24, B(p) = 11, theta* = 3228.3333, z = -17247.3333
  Iteracio 20    iout = 3, q = 0, B(p) = 0, theta* = 0, z = -17247.3333
El problema es il.limitat.
```

2.2 Execució de l'11 amb regla de costos reduïts més negatius

```
-----CONJUNT DE DADES 11, PL 1, REGLA DE CRMN-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 3, B(p) = 30, theta* = 0.38144, z = 3116
  Iteracio 2    iout = 0, q = 9, B(p) = 29, theta* = 0.79603, z = 2568.3281
  Iteracio 3    iout = 0, q = 8, B(p) = 26, theta* = 1.5572, z = 1544.9977
  Iteracio 4    iout = 0, q = 11, B(p) = 24, theta* = 0.41408, z = 1188.865
  Iteracio 5    iout = 0, q = 4, B(p) = 21, theta* = 0.30289, z = 1041.8107
  Iteracio 6    iout = 0, q = 14, B(p) = 22, theta* = 0.49938, z = 737.9155
  Iteracio 7    iout = 0, q = 6, B(p) = 27, theta* = 0.45888, z = 533.6416
  Iteracio 8    iout = 0, q = 1, B(p) = 23, theta* = 0.83424, z = 264.5917
  Iteracio 9    iout = 0, q = 10, B(p) = 25, theta* = 0.78, z = 52.7328
  Iteracio 10    iout = 0, q = 7, B(p) = 28, theta* = 0.51557, z = 0
  Iteracio 11    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
Solucio basica factible de fase I trobada, iteracio 11
Simplex Fase II
  Iteracio 1    iout = 0, q = 13, B(p) = 4, theta* = 2.0546, z = -318.1695
  Iteracio 2    iout = 0, q = 2, B(p) = 8, theta* = 0.66768, z = -335.5557
```

```
  Iteracio 3    iout = 0, q = 16, B(p) = 10, theta* = 227.0763, z = -555.6034
  Iteracio 4    iout = 0, q = 12, B(p) = 11, theta* = 1.595, z = -591.0942
  Iteracio 5    iout = 0, q = 18, B(p) = 3, theta* = 89.2035, z = -715.9426
  Iteracio 6    iout = 0, q = 10, B(p) = 7, theta* = 0.067706, z = -835.7955
  Iteracio 7    iout = 0, q = 11, B(p) = 10, theta* = 0.11283, z = -842.9138
  Iteracio 8    iout = 0, q = 8, B(p) = 12, theta* = 0.13581, z = -843.7283
  Iteracio 9    iout = 0, q = 17, B(p) = 13, theta* = 1.9925, z = -844.8043
  Iteracio 10    iout = 0, q = 12, B(p) = 11, theta* = 0.11969, z = -846.555
  Iteracio 11    iout = 0, q = 19, B(p) = 8, theta* = 20.2262, z = -847.1681
  Iteracio 12    iout = 2, q = 0, B(p) = 0, theta* = 0, z = -847.1681
Solucio basica factible trobada, iteracio 12
vb =

   17   14    1   19   16    2    6   12    9   18

xb =

     3.922     1.180     3.342    20.226   468.294
     4.969     1.310     0.126     2.722   183.537

z = -847.168
rq =

    17.485    73.596   124.487   247.563     0.743
    147.875    12.295   117.068     1.656     0.401

-----CONJUNT DE DADES 11, PL 2, REGLA DE CRMN-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 1, B(p) = 22, theta* = 0.48485, z = 2849.3939
  Iteracio 2    iout = 0, q = 11, B(p) = 29, theta* = 0.59518, z = 2374.9534
  Iteracio 3    iout = 0, q = 9, B(p) = 23, theta* = 0.42791, z = 2011.1236
  Iteracio 4    iout = 0, q = 6, B(p) = 28, theta* = 0.10243, z = 1908.3584
  Iteracio 5    iout = 0, q = 4, B(p) = 6, theta* = 0.38371, z = 1690.7378
  Iteracio 6    iout = 0, q = 3, B(p) = 27, theta* = 0.039015, z = 1583.3177
  Iteracio 7    iout = 0, q = 7, B(p) = 21, theta* = 0.61332, z = 1307.2285
  Iteracio 8    iout = 0, q = 2, B(p) = 26, theta* = 0.99773, z = 828.6499
  Iteracio 9    iout = 0, q = 8, B(p) = 24, theta* = 2.0551, z = 239.7704
  Iteracio 10    iout = 0, q = 14, B(p) = 30, theta* = 0.19628, z = 168.1212
  Iteracio 11    iout = 0, q = 10, B(p) = 25, theta* = 0.86969, z = 0
  Iteracio 12    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
Solucio basica factible de fase I trobada, iteracio 12
Simplex Fase II
  Iteracio 1    iout = 0, q = 13, B(p) = 1, theta* = 0.54263, z = -55.1579
  Iteracio 2    iout = 0, q = 16, B(p) = 10, theta* = 66.7357, z = -75.7184
  Iteracio 3    iout = 0, q = 5, B(p) = 11, theta* = 1.6661, z = -116.6711
  Iteracio 4    iout = 0, q = 10, B(p) = 8, theta* = 0.3103, z = -131.6825
  Iteracio 5    iout = 0, q = 15, B(p) = 2, theta* = 3.1281, z = -132.0626
  Iteracio 6    iout = 0, q = 11, B(p) = 10, theta* = 0.73422, z = -134.6277
```

```
  Iteracio 7    iout = 0, q = 17, B(p) = 11, theta* = 35.165, z = -138.0872
  Iteracio 8    iout = 0, q = 2, B(p) = 13, theta* = 2.3455, z = -157.5315
  Iteracio 9    iout = 2, q = 0, B(p) = 0, theta* = 0, z = -157.5315
Solucio basica factible trobada, iteracio 9
vb =

    7    2    9   17   16   15    3    4    5   14

xb =

     3.548     2.345     0.796   556.647    46.491
     79.254     1.094     1.458     0.956     1.746

z = -157.532
rq =

    18.175    55.172    50.412   160.107     7.926
    28.334    10.997     0.938     0.629     0.842

-----CONJUNT DE DADES 11, PL 3, REGLA DE CRMN-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 9, B(p) = 21, theta* = 0.031579, z = 912.2316
  Iteracio 2    iout = 0, q = 8, B(p) = 29, theta* = 0.093127, z = 831.1017
  Iteracio 3    iout = 0, q = 6, B(p) = 28, theta* = 0.1129, z = 795.2332
  Iteracio 4    iout = 0, q = 1, B(p) = 30, theta* = 0.32797, z = 719.2192
  Iteracio 5    iout = 0, q = 18, B(p) = 8, theta* = 11.5817, z = 703.4345
  Iteracio 6    iout = 0, q = 2, B(p) = 9, theta* = 0.048643, z = 702.8614
  Iteracio 7    iout = 0, q = 16, B(p) = 26, theta* = 124.3021, z = 578.5593
  Iteracio 8    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 578.5593
Solucio basica factible de fase I trobada, iteracio 8
El problema original es infactible.

-----CONJUNT DE DADES 11, PL 4, REGLA DE CRMN-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 9, B(p) = 27, theta* = 6.7805, z = 2270.8049
  Iteracio 2    iout = 0, q = 14, B(p) = 25, theta* = 1.5095, z = 1396.248
  Iteracio 3    iout = 0, q = 11, B(p) = 32, theta* = 1.8411, z = 519.2038
  Iteracio 4    iout = 0, q = 3, B(p) = 29, theta* = 0.62921, z = 346.6479
  Iteracio 5    iout = 0, q = 1, B(p) = 30, theta* = 0.040863, z = 326.3629
  Iteracio 6    iout = 0, q = 7, B(p) = 28, theta* = 0.064048, z = 289.979
  Iteracio 7    iout = 0, q = 8, B(p) = 33, theta* = 0.92042, z = 99.6601
  Iteracio 8    iout = 0, q = 13, B(p) = 31, theta* = 0.28437, z = 58.343
  Iteracio 9    iout = 0, q = 6, B(p) = 34, theta* = 0.20693, z = 24.1961
  Iteracio 10    iout = 0, q = 2, B(p) = 26, theta* = 0.20932, z = 0
  Iteracio 11    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
Solucio basica factible de fase I trobada, iteracio 11
Simplex Fase II
  Iteracio 1    iout = 0, q = 5, B(p) = 6, theta* = 1.6006, z = -428.8083
```

```
  Iteracio 2    iout = 0, q = 12, B(p) = 1, theta* = 0.33941, z = -535.2008
  Iteracio 3    iout = 0, q = 10, B(p) = 9, theta* = 0.53395, z = -700.3305
  Iteracio 4    iout = 0, q = 6, B(p) = 14, theta* = 0.55565, z = -755.9051
  Iteracio 5    iout = 0, q = 4, B(p) = 10, theta* = 1.1964, z = -849.9858
  Iteracio 6    iout = 0, q = 1, B(p) = 3, theta* = 0.56569, z = -929.9068
  Iteracio 7    iout = 0, q = 15, B(p) = 13, theta* = 50.7218, z = -977.4781
  Iteracio 8    iout = 0, q = 17, B(p) = 1, theta* = 1.5301, z = -979.3598
  Iteracio 9    iout = 0, q = 13, B(p) = 15, theta* = 0.92777, z = -1029.5539
  Iteracio 10    iout = 0, q = 14, B(p) = 8, theta* = 0.45942, z = -1072.7406
  Iteracio 11    iout = 0, q = 10, B(p) = 12, theta* = 0.27856, z = -1092.7377
  Iteracio 12    iout = 0, q = 16, B(p) = 10, theta* = 22.8513, z = -1111.8363
  Iteracio 13    iout = 0, q = 8, B(p) = 14, theta* = 0.53067, z = -1115.9739
  Iteracio 14    iout = 0, q = 18, B(p) = 8, theta* = 26.7564, z = -1167.6621
  Iteracio 15    iout = 0, q = 23, B(p) = 16, theta* = 160.9485, z = -1305.3839
  Iteracio 16    iout = 0, q = 8, B(p) = 13, theta* = 1.2168, z = -1323.3863
  Iteracio 17    iout = 0, q = 24, B(p) = 11, theta* = 90.5023, z = -1537.8767
  Iteracio 18    iout = 0, q = 13, B(p) = 8, theta* = 0.69656, z = -1560.1639
  Iteracio 19    iout = 0, q = 15, B(p) = 13, theta* = 33.9898, z = -1616.6493
  Iteracio 20    iout = 0, q = 21, B(p) = 2, theta* = 83.283, z = -1795.8218
  Iteracio 21    iout = 0, q = 1, B(p) = 6, theta* = 0.30355, z = -1873.539
  Iteracio 22    iout = 0, q = 12, B(p) = 5, theta* = 6.9788, z = -2811.2876
  Iteracio 23    iout = 0, q = 8, B(p) = 7, theta* = 1.4193, z = -2904.9248
  Iteracio 24    iout = 0, q = 19, B(p) = 1, theta* = 14.6312, z = -2971.4888
  Iteracio 25    iout = 0, q = 7, B(p) = 8, theta* = 1.018, z = -3039.3625
  Iteracio 26    iout = 0, q = 20, B(p) = 7, theta* = 95.7367, z = -3494.9919
  Iteracio 27    iout = 0, q = 5, B(p) = 12, theta* = 3.8524, z = -3631.7353
  Iteracio 28    iout = 0, q = 22, B(p) = 5, theta* = 441.4167, z = -5740.5833
  Iteracio 29    iout = 0, q = 11, B(p) = 15, theta* = 66.2667, z = -7645.75
  Iteracio 30    iout = 0, q = 16, B(p) = 4, theta* = 114.7143, z = -9395.1429
  Iteracio 31    iout = 3, q = 0, B(p) = 0, theta* = 0, z = -9395.1429
El problema es il.limitat.
```

2.3 Execució del 33 amb regla de Bland

```
-----CONJUNT DE DADES 33, PL 1, REGLA DE BLAND-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 1, B(p) = 24, theta* = 0.42683, z = 2193.378
  Iteracio 2    iout = 0, q = 2, B(p) = 26, theta* = 0.71095, z = 2110.0059
  Iteracio 3    iout = 0, q = 3, B(p) = 2, theta* = 0.56592, z = 2069.1722
  Iteracio 4    iout = 0, q = 4, B(p) = 29, theta* = 0.77959, z = 1707.7779
  Iteracio 5    iout = 0, q = 5, B(p) = 23, theta* = 0.67971, z = 1287.4561
  Iteracio 6    iout = 0, q = 2, B(p) = 21, theta* = 0.5718, z = 1082.6447
  Iteracio 7    iout = 0, q = 7, B(p) = 2, theta* = 0.65192, z = 802.8555
  Iteracio 8    iout = 0, q = 8, B(p) = 22, theta* = 0.45351, z = 636.4031
  Iteracio 9    iout = 0, q = 6, B(p) = 28, theta* = 0.36906, z = 580.349
```

```
  Iteracio 10    iout = 0, q = 9, B(p) = 6, theta* = 0.73586, z = 447.0782
  Iteracio 11    iout = 0, q = 10, B(p) = 27, theta* = 0.11825, z = 389.5286
  Iteracio 12    iout = 0, q = 6, B(p) = 9, theta* = 0.77138, z = 333.9675
  Iteracio 13    iout = 0, q = 11, B(p) = 30, theta* = 0.094057, z = 325.2024
  Iteracio 14    iout = 0, q = 9, B(p) = 8, theta* = 0.28964, z = 278.1005
  Iteracio 15    iout = 0, q = 12, B(p) = 25, theta* = 0.34304, z = 0
  Iteracio 16    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
Solucio basica factible de fase I trobada, iteracio 16
Simplex Fase II
  Iteracio 1    iout = 0, q = 14, B(p) = 10, theta* = 1.6519, z = 110.4695
  Iteracio 2    iout = 0, q = 16, B(p) = 6, theta* = 219.288, z = 107.1492
  Iteracio 3    iout = 0, q = 10, B(p) = 14, theta* = 1.4279, z = 106.6633
  Iteracio 4    iout = 0, q = 17, B(p) = 10, theta* = 426.9536, z = 71.7137
  Iteracio 5    iout = 0, q = 2, B(p) = 4, theta* = 0.22359, z = 69.9901
  Iteracio 6    iout = 0, q = 18, B(p) = 2, theta* = 85.9404, z = 44.3584
  Iteracio 7    iout = 0, q = 6, B(p) = 7, theta* = 0.49614, z = 19.4772
  Iteracio 8    iout = 0, q = 4, B(p) = 3, theta* = 0.25687, z = 5.2539
  Iteracio 9    iout = 0, q = 10, B(p) = 5, theta* = 1.4771, z = -62.3679
  Iteracio 10    iout = 0, q = 3, B(p) = 11, theta* = 0.28631, z = -85.7035
  Iteracio 11    iout = 0, q = 14, B(p) = 6, theta* = 0.0028687, z = -85.8493
  Iteracio 12    iout = 0, q = 11, B(p) = 3, theta* = 0.20674, z = -91.228
  Iteracio 13    iout = 0, q = 19, B(p) = 14, theta* = 87.1324, z = -109.6022
  Iteracio 14    iout = 0, q = 7, B(p) = 10, theta* = 0.3816, z = -133.8826
  Iteracio 15    iout = 2, q = 0, B(p) = 0, theta* = 0, z = -133.8826
Solucio basica factible trobada, iteracio 15
vb =

   19    9    7    1   12    4   17   16   18   11

xb =

   287.238     1.897     0.382     5.063     4.835
   0.476   511.173   491.979   624.956     1.591

z = -133.883
rq =

   34.8785   86.5821   65.2014   46.1890    0.2331
   17.6243   52.0091   40.1260   44.0254    0.0137

-----CONJUNT DE DADES 33, PL 2, REGLA DE BLAND-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 2, B(p) = 27, theta* = 0.89041, z = 2449.2877
  Iteracio 2    iout = 0, q = 1, B(p) = 22, theta* = 1.558, z = 2191.1866
  Iteracio 3    iout = 0, q = 3, B(p) = 28, theta* = 1.9683, z = 1948.1458
  Iteracio 4    iout = 0, q = 5, B(p) = 23, theta* = 2.199, z = 1290.3424
  Iteracio 5    iout = 0, q = 6, B(p) = 29, theta* = 0.26493, z = 1167.95
  Iteracio 6    iout = 0, q = 4, B(p) = 3, theta* = 0.056456, z = 1158.5605
```

```
  Iteracio 7    iout = 0, q = 7, B(p) = 4, theta* = 0.23485, z = 1135.2032
  Iteracio 8    iout = 0, q = 8, B(p) = 24, theta* = 0.045295, z = 1101.0824
  Iteracio 9    iout = 0, q = 4, B(p) = 1, theta* = 2.3083, z = 878.881
  Iteracio 10    iout = 0, q = 9, B(p) = 30, theta* = 0.3918, z = 724.2954
  Iteracio 11    iout = 0, q = 1, B(p) = 7, theta* = 1.1282, z = 719.197
  Iteracio 12    iout = 0, q = 3, B(p) = 21, theta* = 0.99386, z = 490.8288
  Iteracio 13    iout = 0, q = 7, B(p) = 1, theta* = 0.51927, z = 214.5199
  Iteracio 14    iout = 0, q = 10, B(p) = 25, theta* = 0.071736, z = 180.1488
  Iteracio 15    iout = 0, q = 1, B(p) = 7, theta* = 2.0538, z = 139.1264
  Iteracio 16    iout = 0, q = 12, B(p) = 6, theta* = 0.21616, z = 112.5182
  Iteracio 17    iout = 0, q = 7, B(p) = 1, theta* = 1.0783, z = 83.1667
  Iteracio 18    iout = 0, q = 13, B(p) = 9, theta* = 0.63985, z = 37.3457
  Iteracio 19    iout = 0, q = 6, B(p) = 26, theta* = 0.4667, z = 0
  Iteracio 20    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
Solucio basica factible de fase I trobada, iteracio 20
Simplex Fase II
  Iteracio 1    iout = 0, q = 15, B(p) = 12, theta* = 132.0268, z = -442.5912
  Iteracio 2    iout = 0, q = 18, B(p) = 15, theta* = 60.7186, z = -477.3105
  Iteracio 3    iout = 0, q = 11, B(p) = 10, theta* = 0.31658, z = -483.3705
  Iteracio 4    iout = 0, q = 16, B(p) = 11, theta* = 75.1507, z = -512.4263
  Iteracio 5    iout = 0, q = 1, B(p) = 6, theta* = 0.48148, z = -519.7467
  Iteracio 6    iout = 0, q = 19, B(p) = 1, theta* = 49.4894, z = -549.8378
  Iteracio 7    iout = 0, q = 11, B(p) = 13, theta* = 0.32157, z = -558.3333
  Iteracio 8    iout = 0, q = 6, B(p) = 3, theta* = 0.22576, z = -572.9254
  Iteracio 9    iout = 0, q = 20, B(p) = 16, theta* = 160.1023, z = -659.8515
  Iteracio 10    iout = 2, q = 0, B(p) = 0, theta* = 0, z = -659.8515
Solucio basica factible trobada, iteracio 10
vb =

    6    4    5    8   20   19    2    7   18   11

xb =

     0.6387     3.8565     6.3586     2.7215   160.1023
     188.3716     0.0427     0.2054   406.1112    0.8599

z = -659.852
rq =

     9.915    91.603   132.506   187.649    60.912
     65.302     0.113     0.408     4.914     0.528

-----CONJUNT DE DADES 33, PL 3, REGLA DE BLAND-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 1, B(p) = 28, theta* = 0.065789, z = 1613.3947
  Iteracio 2    iout = 0, q = 2, B(p) = 30, theta* = 0.17302, z = 1590.8065
  Iteracio 3    iout = 0, q = 3, B(p) = 1, theta* = 0.070926, z = 1575.7385
  Iteracio 4    iout = 0, q = 4, B(p) = 2, theta* = 0.20512, z = 1535.1405
```

```
  Iteracio 5    iout = 0, q = 7, B(p) = 4, theta* = 0.18754, z = 1530.1267
  Iteracio 6    iout = 0, q = 11, B(p) = 7, theta* = 0.42591, z = 1400.7535
  Iteracio 7    iout = 0, q = 14, B(p) = 3, theta* = 0.048193, z = 1400.7181
  Iteracio 8    iout = 0, q = 16, B(p) = 26, theta* = 111.9084, z = 1288.8096
  Iteracio 9    iout = 0, q = 3, B(p) = 14, theta* = 0.053156, z = 1288.7362
  Iteracio 10    iout = 0, q = 17, B(p) = 27, theta* = 135.5143, z = 1153.2219
  Iteracio 11    iout = 0, q = 10, B(p) = 3, theta* = 0.02852, z = 1151.2282
  Iteracio 12    iout = 0, q = 19, B(p) = 29, theta* = 67.1319, z = 1084.0963
  Iteracio 13    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 1084.0963
Solucio basica factible de fase I trobada, iteracio 13
El problema original es infactible.

-----CONJUNT DE DADES 33, PL 4, REGLA DE BLAND-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 1, B(p) = 33, theta* = 8.962, z = 2561.2911
  Iteracio 2    iout = 0, q = 2, B(p) = 28, theta* = 0.18316, z = 2517.0603
  Iteracio 3    iout = 0, q = 3, B(p) = 31, theta* = 1.3939, z = 2101.8733
  Iteracio 4    iout = 0, q = 4, B(p) = 27, theta* = 3.2822, z = 986.9345
  Iteracio 5    iout = 0, q = 5, B(p) = 30, theta* = 0.018021, z = 982.8547
  Iteracio 6    iout = 0, q = 6, B(p) = 5, theta* = 0.02366, z = 978.8114
  Iteracio 7    iout = 0, q = 8, B(p) = 34, theta* = 0.7502, z = 867.8361
  Iteracio 8    iout = 0, q = 5, B(p) = 3, theta* = 0.46253, z = 838.9497
  Iteracio 9    iout = 0, q = 7, B(p) = 5, theta* = 0.27071, z = 798.4617
  Iteracio 10    iout = 0, q = 9, B(p) = 32, theta* = 0.59725, z = 425.036
  Iteracio 11    iout = 0, q = 3, B(p) = 1, theta* = 1.5814, z = 407.9082
  Iteracio 12    iout = 0, q = 5, B(p) = 6, theta* = 0.81817, z = 306.8732
  Iteracio 13    iout = 0, q = 1, B(p) = 26, theta* = 0.74789, z = 256.753
  Iteracio 14    iout = 0, q = 6, B(p) = 3, theta* = 0.79593, z = 178.8779
  Iteracio 15    iout = 0, q = 11, B(p) = 6, theta* = 0.7793, z = 142.7675
  Iteracio 16    iout = 0, q = 10, B(p) = 2, theta* = 2.5796, z = 30.3691
  Iteracio 17    iout = 0, q = 3, B(p) = 8, theta* = 0.3845, z = 14.8419
  Iteracio 18    iout = 0, q = 12, B(p) = 29, theta* = 0.0080382, z = 13.8655
  Iteracio 19    iout = 0, q = 8, B(p) = 3, theta* = 0.60648, z = 1.1784
  Iteracio 20    iout = 0, q = 2, B(p) = 25, theta* = 0.066092, z = 0
  Iteracio 21    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
Solucio basica factible de fase I trobada, iteracio 21
Simplex Fase II
  Iteracio 1    iout = 0, q = 13, B(p) = 2, theta* = 0.13989, z = -653.8782
  Iteracio 2    iout = 0, q = 3, B(p) = 12, theta* = 0.10274, z = -671.3356
  Iteracio 3    iout = 0, q = 2, B(p) = 4, theta* = 0.069865, z = -673.5835
  Iteracio 4    iout = 0, q = 6, B(p) = 2, theta* = 0.049616, z = -673.7943
  Iteracio 5    iout = 0, q = 14, B(p) = 9, theta* = 2.8708, z = -783.8449
  Iteracio 6    iout = 0, q = 2, B(p) = 7, theta* = 0.39097, z = -784.8558
  Iteracio 7    iout = 0, q = 16, B(p) = 1, theta* = 37.5283, z = -785.0581
  Iteracio 8    iout = 0, q = 19, B(p) = 8, theta* = 12.2131, z = -806.1132
  Iteracio 9    iout = 0, q = 1, B(p) = 2, theta* = 0.20413, z = -821.947
  Iteracio 10    iout = 0, q = 7, B(p) = 10, theta* = 0.2455, z = -840.1863
  Iteracio 11    iout = 0, q = 12, B(p) = 11, theta* = 0.48348, z = -849.0531
```

```
  Iteracio 12    iout = 0, q = 17, B(p) = 1, theta* = 59.8266, z = -853.5889
  Iteracio 13    iout = 0, q = 21, B(p) = 6, theta* = 37.7883, z = -873.0262
  Iteracio 14    iout = 0, q = 10, B(p) = 7, theta* = 0.029769, z = -874.1054
  Iteracio 15    iout = 0, q = 1, B(p) = 19, theta* = 2.2104, z = -901.1048
  Iteracio 16    iout = 0, q = 4, B(p) = 14, theta* = 0.62923, z = -927.2428
  Iteracio 17    iout = 0, q = 15, B(p) = 4, theta* = 43.9082, z = -953.0485
  Iteracio 18    iout = 0, q = 18, B(p) = 15, theta* = 49.5638, z = -960.0956
  Iteracio 19    iout = 0, q = 7, B(p) = 13, theta* = 0.29171, z = -961.2933
  Iteracio 20    iout = 0, q = 19, B(p) = 3, theta* = 154.5976, z = -981.8086
  Iteracio 21    iout = 0, q = 13, B(p) = 5, theta* = 3.4265, z = -1010.8925
  Iteracio 22    iout = 0, q = 3, B(p) = 7, theta* = 0.19093, z = -1011.513
  Iteracio 23    iout = 0, q = 22, B(p) = 1, theta* = 228.0399, z = -1181.3216
  Iteracio 24    iout = 0, q = 5, B(p) = 18, theta* = 1.3554, z = -1183.3859
  Iteracio 25    iout = 0, q = 7, B(p) = 12, theta* = 1.8336, z = -1334.7834
  Iteracio 26    iout = 0, q = 15, B(p) = 17, theta* = 41.7308, z = -1355.3715
  Iteracio 27    iout = 0, q = 18, B(p) = 13, theta* = 84.1135, z = -1467.145
  Iteracio 28    iout = 0, q = 9, B(p) = 15, theta* = 1.3838, z = -1484.4124
  Iteracio 29    iout = 0, q = 12, B(p) = 5, theta* = 0.34931, z = -1489.8857
  Iteracio 30    iout = 0, q = 14, B(p) = 12, theta* = 0.41074, z = -1493.8295
  Iteracio 31    iout = 0, q = 15, B(p) = 9, theta* = 127.6378, z = -1505.9023
  Iteracio 32    iout = 0, q = 17, B(p) = 14, theta* = 187.8374, z = -1707.9043
  Iteracio 33    iout = 0, q = 20, B(p) = 17, theta* = 87.2773, z = -1718.9157
  Iteracio 34    iout = 0, q = 23, B(p) = 10, theta* = 422.0684, z = -2028.0936
  Iteracio 35    iout = 0, q = 17, B(p) = 7, theta* = 1374.2, z = -3861
  Iteracio 36    iout = 3, q = 0, B(p) = 0, theta* = 0, z = -3861
El problema es il.limitat.
```

2.4 Execució del 33 amb regla de costos reduïts més negatius

```
-----CONJUNT DE DADES 33, PL 1, REGLA DE CRMN-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 10, B(p) = 24, theta* = 0.625, z = 2006
  Iteracio 2    iout = 0, q = 12, B(p) = 27, theta* = 0.25526, z = 1809.7055
  Iteracio 3    iout = 0, q = 1, B(p) = 23, theta* = 0.0041454, z = 1804.8546
  Iteracio 4    iout = 0, q = 7, B(p) = 22, theta* = 0.028334, z = 1782.8382
  Iteracio 5    iout = 0, q = 14, B(p) = 30, theta* = 0.19842, z = 1296.9074
  Iteracio 6    iout = 0, q = 3, B(p) = 26, theta* = 0.228, z = 1210.2844
  Iteracio 7    iout = 0, q = 4, B(p) = 14, theta* = 0.27129, z = 1094.1636
  Iteracio 8    iout = 0, q = 11, B(p) = 29, theta* = 0.018143, z = 972.7171
  Iteracio 9    iout = 0, q = 5, B(p) = 11, theta* = 0.031638, z = 960.909
  Iteracio 10    iout = 0, q = 6, B(p) = 21, theta* = 0.16115, z = 779.7943
  Iteracio 11    iout = 0, q = 11, B(p) = 12, theta* = 0.63298, z = 399.9176
  Iteracio 12    iout = 0, q = 9, B(p) = 28, theta* = 0.28964, z = 278.1005
  Iteracio 13    iout = 0, q = 12, B(p) = 25, theta* = 0.34304, z = 0
  Iteracio 14    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
```

```
Solucio basica factible de fase I trobada, iteracio 14
Simplex Fase II
  Iteracio 1    iout = 0, q = 14, B(p) = 10, theta* = 1.6519, z = 110.4695
  Iteracio 2    iout = 0, q = 18, B(p) = 3, theta* = 271.7075, z = 36.6735
  Iteracio 3    iout = 0, q = 10, B(p) = 5, theta* = 1.0018, z = -16.0758
  Iteracio 4    iout = 0, q = 20, B(p) = 6, theta* = 56.644, z = -31.5472
  Iteracio 5    iout = 0, q = 3, B(p) = 11, theta* = 0.9966, z = -36.6716
  Iteracio 6    iout = 0, q = 17, B(p) = 7, theta* = 90.101, z = -53.28
  Iteracio 7    iout = 0, q = 11, B(p) = 10, theta* = 0.81145, z = -71.6942
  Iteracio 8    iout = 0, q = 16, B(p) = 3, theta* = 25.0702, z = -75.5528
  Iteracio 9    iout = 0, q = 10, B(p) = 20, theta* = 1.8895, z = -91.228
  Iteracio 10    iout = 0, q = 19, B(p) = 14, theta* = 87.1324, z = -109.6022
  Iteracio 11    iout = 0, q = 7, B(p) = 10, theta* = 0.3816, z = -133.8826
  Iteracio 12    iout = 2, q = 0, B(p) = 0, theta* = 0, z = -133.8826
Solucio basica factible trobada, iteracio 12
vb =

    7   17    1   19   12   18   16    9   11    4

xb =

     0.382   511.173     5.063   287.238     4.835
     624.956   491.979     1.897     1.591     0.476

z = -133.883
rq =

   40.1260   86.5821   65.2014   52.0091    0.2331
   34.8785   17.6243    0.0137   44.0254   46.1890

-----CONJUNT DE DADES 33, PL 2, REGLA DE CRMN-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 5, B(p) = 21, theta* = 1.1753, z = 2148.0103
  Iteracio 2    iout = 0, q = 6, B(p) = 24, theta* = 1.133, z = 1413.9429
  Iteracio 3    iout = 0, q = 4, B(p) = 27, theta* = 0.062513, z = 1365.0851
  Iteracio 4    iout = 0, q = 8, B(p) = 29, theta* = 0.55921, z = 928.6327
  Iteracio 5    iout = 0, q = 7, B(p) = 28, theta* = 0.021671, z = 909.0914
  Iteracio 6    iout = 0, q = 12, B(p) = 30, theta* = 0.27273, z = 803.4627
  Iteracio 7    iout = 0, q = 10, B(p) = 23, theta* = 0.49811, z = 587.882
  Iteracio 8    iout = 0, q = 3, B(p) = 6, theta* = 0.35971, z = 297.5597
  Iteracio 9    iout = 0, q = 14, B(p) = 26, theta* = 0.27001, z = 193.8648
  Iteracio 10    iout = 0, q = 2, B(p) = 22, theta* = 0.59164, z = 23.9209
  Iteracio 11    iout = 0, q = 9, B(p) = 25, theta* = 0.084521, z = 0
  Iteracio 12    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
Solucio basica factible de fase I trobada, iteracio 12
Simplex Fase II
  Iteracio 1    iout = 0, q = 13, B(p) = 9, theta* = 0.21546, z = -304.2116
  Iteracio 2    iout = 0, q = 6, B(p) = 14, theta* = 0.4667, z = -433.068
```

```
  Iteracio 3    iout = 0, q = 18, B(p) = 12, theta* = 60.7186, z = -477.3105
  Iteracio 4    iout = 0, q = 11, B(p) = 10, theta* = 0.31658, z = -483.3705
  Iteracio 5    iout = 0, q = 20, B(p) = 11, theta* = 62.4712, z = -545.1838
  Iteracio 6    iout = 0, q = 12, B(p) = 2, theta* = 0.31866, z = -577.6367
  Iteracio 7    iout = 0, q = 1, B(p) = 12, theta* = 0.35061, z = -578.1142
  Iteracio 8    iout = 0, q = 19, B(p) = 1, theta* = 38.739, z = -603.2957
  Iteracio 9    iout = 0, q = 11, B(p) = 13, theta* = 0.7672, z = -658.9605
  Iteracio 10    iout = 0, q = 2, B(p) = 3, theta* = 0.042738, z = -659.8515
  Iteracio 11    iout = 2, q = 0, B(p) = 0, theta* = 0, z = -659.8515
Solucio basica factible trobada, iteracio 11
vb =

    5   19   20    2   11    6    4    7    8   18

xb =


     6.3586   188.3716   160.1023     0.0427     0.8599
     0.6387     3.8565     0.2054     2.7215   406.1112

z = -659.852
rq =

    60.912   187.649   132.506    91.603     0.408
    0.528     0.113     9.915     4.914    65.302

-----CONJUNT DE DADES 33, PL 3, REGLA DE CRMN-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 10, B(p) = 28, theta* = 0.05, z = 1599.25
  Iteracio 2    iout = 0, q = 11, B(p) = 30, theta* = 0.42959, z = 1402.82
  Iteracio 3    iout = 0, q = 14, B(p) = 10, theta* = 0.048193, z = 1400.7181
  Iteracio 4    iout = 0, q = 16, B(p) = 26, theta* = 111.9084, z = 1288.8096
  Iteracio 5    iout = 0, q = 3, B(p) = 14, theta* = 0.053156, z = 1288.7362
  Iteracio 6    iout = 0, q = 17, B(p) = 27, theta* = 135.5143, z = 1153.2219
  Iteracio 7    iout = 0, q = 10, B(p) = 3, theta* = 0.02852, z = 1151.2282
  Iteracio 8    iout = 0, q = 19, B(p) = 29, theta* = 67.1319, z = 1084.0963
  Iteracio 9    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 1084.0963
Solucio basica factible de fase I trobada, iteracio 9
El problema original es infactible

-----CONJUNT DE DADES 33, PL 4, REGLA DE CRMN-----
Simplex Fase I
  Iteracio 1    iout = 0, q = 13, B(p) = 27, theta* = 6.5111, z = 2497.6222
  Iteracio 2    iout = 0, q = 7, B(p) = 26, theta* = 1.4811, z = 1740.4254
  Iteracio 3    iout = 0, q = 8, B(p) = 31, theta* = 1.0118, z = 1384.142
  Iteracio 4    iout = 0, q = 6, B(p) = 30, theta* = 0.72865, z = 1110.2387
  Iteracio 5    iout = 0, q = 9, B(p) = 32, theta* = 0.57565, z = 772.8819
  Iteracio 6    iout = 0, q = 2, B(p) = 34, theta* = 0.70872, z = 582.5258
```

```
  Iteracio 7    iout = 0, q = 12, B(p) = 29, theta* = 1.1858, z = 372.276
  Iteracio 8    iout = 0, q = 1, B(p) = 28, theta* = 1.0855, z = 161.8031
  Iteracio 9    iout = 0, q = 5, B(p) = 25, theta* = 0.48682, z = 16.3425
  Iteracio 10    iout = 0, q = 3, B(p) = 33, theta* = 0.57011, z = 0
  Iteracio 11    iout = 2, q = 0, B(p) = 0, theta* = 0, z = 0
Solucio basica factible de fase I trobada, iteracio 11
Simplex Fase II
  Iteracio 1    iout = 0, q = 14, B(p) = 1, theta* = 1.7079, z = -694.0621
  Iteracio 2    iout = 0, q = 10, B(p) = 9, theta* = 0.68597, z = -750.9336
  Iteracio 3    iout = 0, q = 11, B(p) = 7, theta* = 0.99222, z = -776.4186
  Iteracio 4    iout = 0, q = 4, B(p) = 12, theta* = 0.05874, z = -783.7383
  Iteracio 5    iout = 0, q = 1, B(p) = 4, theta* = 0.16407, z = -784.8558
  Iteracio 6    iout = 0, q = 24, B(p) = 2, theta* = 9.4077, z = -801.375
  Iteracio 7    iout = 0, q = 4, B(p) = 8, theta* = 0.42637, z = -840.6591
  Iteracio 8    iout = 0, q = 12, B(p) = 1, theta* = 0.082376, z = -846.0271
  Iteracio 9    iout = 0, q = 8, B(p) = 11, theta* = 0.039143, z = -847.7174
  Iteracio 10    iout = 0, q = 9, B(p) = 8, theta* = 0.068977, z = -848.2946
  Iteracio 11    iout = 0, q = 21, B(p) = 9, theta* = 2.5358, z = -849.9981
  Iteracio 12    iout = 0, q = 1, B(p) = 13, theta* = 0.57902, z = -852.3913
  Iteracio 13    iout = 0, q = 22, B(p) = 1, theta* = 41.8443, z = -893.5294
  Iteracio 14    iout = 0, q = 8, B(p) = 4, theta* = 0.66269, z = -916.3441
  Iteracio 15    iout = 0, q = 7, B(p) = 12, theta* = 0.25015, z = -918.5257
  Iteracio 16    iout = 0, q = 16, B(p) = 7, theta* = 87.1818, z = -980.8144
  Iteracio 17    iout = 0, q = 2, B(p) = 8, theta* = 0.18027, z = -1025.946
  Iteracio 18    iout = 0, q = 7, B(p) = 14, theta* = 0.40738, z = -1095.7858
  Iteracio 19    iout = 0, q = 1, B(p) = 24, theta* = 1.967, z = -1109.5562
  Iteracio 20    iout = 0, q = 9, B(p) = 2, theta* = 0.01477, z = -1109.6911
  Iteracio 21    iout = 0, q = 13, B(p) = 6, theta* = 0.24237, z = -1110.5077
  Iteracio 22    iout = 0, q = 19, B(p) = 1, theta* = 158.3371, z = -1300.29
  Iteracio 23    iout = 0, q = 15, B(p) = 9, theta* = 41.7308, z = -1355.3715
  Iteracio 24    iout = 0, q = 18, B(p) = 13, theta* = 84.1135, z = -1467.145
  Iteracio 25    iout = 0, q = 14, B(p) = 5, theta* = 2.218, z = -1505.9023
  Iteracio 26    iout = 0, q = 20, B(p) = 14, theta* = 87.2773, z = -1718.9157
  Iteracio 27    iout = 0, q = 24, B(p) = 3, theta* = 7522.6742, z = -12142.9023
  Iteracio 28    iout = 0, q = 23, B(p) = 10, theta* = 757, z = -27835
  Iteracio 29    iout = 3, q = 0, B(p) = 0, theta* = 0, z = -27835
El problema es il.limitat.
```

Comentari: Els vectors xb i rq els hem posat en dues files perquè encaixin amb l'amplada de la pàgina (no són matrius de dues files).