

## Numerische Optimierung

### Resultat 1

Das Programm DSPLP liefert die folgende Ausgabe:

```
NUM. OF DEPENDENT VARS., MRELAS
  1 -   1   4
NUM. OF INDEPENDENT VARS., NVAR
  1 -   1  13
DIMENSION OF COSTS(*)=
  1 -   1  13
DIMENSIONS OF BL(*),BU(*),IND(*)
PRIMAL(*),DUALS(*) =
  1 -   1  17
DIMENSION OF IBASIS(*)=
  1 -   1  17
DIMENSION OF PRGOPT(*)=
  1 -   1   7
1-NVAR=INDEPENDENT VARIABLE INDICES.
(NVAR+1)-(NVAR+MRELAS)=DEPENDENT VARIABLE INDICES.
CONSTRAINT INDICATORS ARE 1-4 AND MEAN
1=VARIABLE HAS ONLY LOWER BOUND.
2=VARIABLE HAS ONLY UPPER BOUND.
3=VARIABLE HAS BOTH BOUNDS.
4=VARIABLE HAS NO BOUNDS, IT IS FREE.
ARRAY OF COSTS
  1 -   4  2.40000D-01  1.50000D-01  2.50000D-01  4.00000D-02
  5 -   8  4.00000D-02  4.00000D-02  4.00000D-02 -1.50000D-01
  9 -  12 -3.12500D-01 -8.00000D-02 -8.00000D-02 -8.00000D-02
 13 -  13 -8.00000D-02
CONSTRAINT INDICATORS
  1 -  10   3   3   3   1   1   1   1   3   3   1
 11 -  17   1   1   1   2   2   2   2
```

LOWER BOUNDS FOR VARIABLES (IGNORE UNUSED ENTRIES.)

1 - 4	.00000D+00	.00000D+00	.00000D+00	.00000D+00
5 - 8	.00000D+00	.00000D+00	.00000D+00	.00000D+00
9 - 12	.00000D+00	.00000D+00	.00000D+00	.00000D+00
13 - 16	.00000D+00	.00000D+00	.00000D+00	.00000D+00
17 - 17	.00000D+00			

UPPER BOUNDS FOR VARIABLES (IGNORE UNUSED ENTRIES.)

1 - 4	5.00000D+01	1.00000D+02	4.00000D+01	.00000D+00
5 - 8	.00000D+00	.00000D+00	.00000D+00	5.00000D+01
9 - 12	8.00000D+01	.00000D+00	.00000D+00	.00000D+00
13 - 16	.00000D+00	3.00000D+01	3.00000D+01	3.00000D+01
17 - 17	3.00000D+01			

THIS IS A MAXIMIZATION PROBLEM.

STEEPEST EDGE PRICING WAS USED.

OUTPUT VALUE OF THE OBJECTIVE FUNCTION

1 - 1 1.27211D+01

THE OUTPUT INDEPENDENT AND DEPENDENT VARIABLES

1 - 4	5.00000D+01	.00000D+00	4.00000D+01	3.00000D+01
5 - 8	3.17000D+01	.00000D+00	.00000D+00	5.00000D+01
9 - 12	.00000D+00	.00000D+00	.00000D+00	6.53200D+00
13 - 16	4.65546D+01	3.00000D+01	3.00000D+01	3.00000D+01
17 - 17	3.00000D+01			

THE OUTPUT DUAL VARIABLES

1 - 4	4.85222D-02	4.66560D-02	8.64000D-02	8.00000D-02
5 - 8	5.98912D-03	-7.40544D-03	1.03600D-01	.00000D+00
9 - 12	.00000D+00	-4.32000D-02	-4.00000D-02	8.60544D-03
13 - 16	-9.94440D-02	-4.85222D-02	-4.66560D-02	.00000D+00
17 - 17	.00000D+00			

VARIABLE INDICES IN POSITIONS 1-MRELAS ARE BASIC.

1 - 10	4	5	13	12	2	14	16	8	15	6
11 - 17	7	1	9	10	11	17	3			

NO. OF ITERATIONS

1 - 1 8

NO. OF FULL REDECOMPS

1 - 1 2

Das Programm PCx liefert (auszugsweise) die Ausgaben

\*\*\*\*\* PCx version 1.1 (Nov 1997) \*\*\*\*\*

Problem 'INVEST' terminated with OPTIMAL status  
Iterations=6, Termination Code=0

MPS formulation has 4 rows, 13 columns

PARAMETER SUMMARY

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Maximum number of iterations: 100  
Tolerances: Opt=1.00e-10 PriFeas=1.00e-08 DualFeas=1.00e-08  
Gondzio strategy selected: Maximum Gondzio corrections = 0  
NO iterative refinement  
Presolving was performed:  
  Before Presolving: 4 rows, 17 columns  
  After Presolving: 4 rows, 17 columns (0 passes)  
MAXIMIZE the objective  
Solution written to output file invest.out

FACTORIZATION SUMMARY

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code used: Ng-Peyton sparse Cholesky library  
Nonzeros in L=10; Density of L=1.000000

ITERATION SUMMARY

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Iter	Primal	Dual	(PriInf	DualInf)	log(mu)	Merit
0	4.7840e+00	3.5479e+01	(3.9e-01	1.1e-01)	0.38	5.8e-01
1	7.7003e+00	1.7011e+01	(6.2e-02	2.7e-02)	-0.27	1.1e-01
2	1.0501e+01	1.3879e+01	(2.6e-02	6.2e-03)	-0.71	4.1e-02
3	1.2415e+01	1.2991e+01	(1.1e-03	2.2e-03)	-1.45	4.8e-03
4	1.2705e+01	1.2781e+01	(4.7e-05	5.0e-04)	-2.25	7.5e-04
5	1.2721e+01	1.2722e+01	(2.7e-16	4.4e-06)	-4.33	6.0e-06
6	1.2721e+01	1.2721e+01	(1.8e-16	2.8e-12)	-10.26	5.3e-12

6 iterations

Terminated with status OPTIMAL (code 0)

Primal Objective = 1.27210752e+01  
Dual Objective = 1.27210752e+01

Complementarity = 7.22e-10  
Relative Complementarity = 5.26e-11

Relative Infeasibilities:  
Primal = 1.401e-16, Dual = 2.574e-12.

und

Solution for 'INVEST '  
Variables:

#	Label	Value	Reduced Cost	Lower Bound	Upper Bound
0	X1	5.0000000e+01	0.0000000e+00	0.0000000e+00	5.0000000e+01
1	X2	5.5177689e-08	7.4054400e-03	0.0000000e+00	1.0000000e+02
2	X3	4.0000000e+01	0.0000000e+00	0.0000000e+00	4.0000000e+01
3	X4	3.0000000e+01	6.1008873e-13	0.0000000e+00	Infinity
4	X5	3.1700000e+01	1.0574137e-12	0.0000000e+00	Infinity
5	X6	1.6844813e-11	4.3200000e-02	0.0000000e+00	Infinity
6	X7	2.9373345e-10	4.0000000e-02	0.0000000e+00	Infinity
7	X8	5.0000000e+01	0.0000000e+00	0.0000000e+00	5.0000000e+01
8	X9	1.2505901e-11	9.9444000e-02	0.0000000e+00	8.0000000e+01
9	X10	2.4016360e-11	4.8522240e-02	0.0000000e+00	Infinity
10	X11	2.8199585e-11	4.6656000e-02	0.0000000e+00	Infinity
11	X12	6.5320000e+00	2.8924595e-12	0.0000000e+00	Infinity
12	X13	4.6554560e+01	0.0000000e+00	0.0000000e+00	Infinity