

# Программа GOAL.EXE

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Исследование операций  
с применением компьютера  
Версия 2.00a (2007)

## Reading problem from a file

Number of variables (max.12) 3  
 Number of goals (max.12) 4  
 Number of constraints (max.12) 3

Goal	x( 1)		y(+)	y(-)	P
1	2.00	≥	15.00	0.00	2
2	3.00	≤	8.00	2.00	2
3	1.00	≥	20.00	0.00	1
4	0.00	≤	15.00	2.00	1

## Reading problem from a file

Number of variables (max.12)  
 Number of goals (max.12)  
 Number of constraints (max.12)

Constr..	x( 1)	x( 2)	x( 3)		
1	2.00	3.00	2.00	≤	15.00
2	2.00	1.00	2.00	≤	15.00
3	1.00	-1.00	2.00	≥	7.00
	0.00	0.00	0.00		Lower bounds
	1000.00	1000.00	1000.00		Upper bounds

Balancing of goals

Goal no.	x(1)	x(2)	x(3)	Expectations of the decision-maker	Deviation weights y(+)	y(-)	P
1	2.00	3.00	2.00	≥ 15.00	0.00	4.00	2
2	3.00	2.00	10.00	≤ 8.00	2.00	0.00	2
3	1.00	2.00	1.00	≥ 20.00	0.00	1.50	1
4	0.00	1.00	0.00	≤ 15.00	2.00	0.00	1

The goal equation for goal no. 1

$$\begin{aligned}
 &2.00 * x(1) + 3.00 * x(2) + \\
 &2.00 * x(3) + \\
 &-1.00 * y+(1) + 1.00 * y-(1) + \\
 &0.00 * y+(2) + 0.00 * y-(2) + \\
 &0.00 * y+(3) + 0.00 * y-(3) + \\
 &0.00 * y+(4) + 0.00 * y-(4) = 15
 \end{aligned}$$

Enter coefficients of the goal equation for goal 1

Defining problem Z(1)

Goal no.	x(1)	x(2)	x(3)	Expectations of the decision-maker	Deviation weights y(+)	y(-)	P
1	2.00	3.00	2.00	≥ 15.00	0.00	4.00	2
2	3.00	2.00	10.00	≤ 8.00	2.00	0.00	2
3	1.00	2.00	1.00	≥ 20.00	0.00	1.50	1
4	0.00	1.00	0.00	≤ 15.00	2.00	0.00	1

Objective function

$$\begin{aligned}
 & 0.00 * x(1) + 0.00 * x(2) + \\
 & 0.00 * x(3) + \\
 & 0.00 * y+(1) + 0.00 * y-(1) + \\
 & 0.00 * y+(2) + 0.00 * y-(2) + \\
 & 0.00 * y+(3) + 1.50 * y-(3) + \\
 & 2.00 * y+(4) + 0.00 * y-(4) \longrightarrow \text{MIN}
 \end{aligned}$$

Enter coefficients of the objective function in problem Z(1)

Problem Z(1)

x(1)	x(2)	x(3)	y+(1)	y-(1)	y+(2)	y-(2)	y+(3)	y-(3)	y+(4)	y-(4)	
Objective function											
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	2.0	0.0 → min
Goal balancing											
2.0	3.0	2.0	-1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	= 15.0
3.0	2.0	10.0	0.0	0.0	-1.0	1.0	0.0	0.0	0.0	0.0	= 8.0
1.0	2.0	1.0	0.0	0.0	0.0	0.0	-1.0	1.0	0.0	0.0	= 20.0
0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0	1.0	= 15.0
Problem constraints											
2.0	3.0	2.0									≤ 15.0
2.0	1.0	2.0									≤ 15.0
1.0	-1.0	2.0									≥ 7.0

Value of the objective function = 17.25

Defining problem Z(2)

Goal no.	x(1)	x(2)	x(3)	Expectations of the decision-maker	Deviation weights y(+)	y(-)	P
1	2.00	3.00	2.00	≥ 15.00	0.00	4.00	2
2	3.00	2.00	10.00	≤ 8.00	2.00	0.00	2
3	1.00	2.00	1.00	≥ 20.00	0.00	1.50	1
4	0.00	1.00	0.00	≤ 15.00	2.00	0.00	1

Value of the problem's objective function:  
Z(1)= 17.25

Objective function

$$\begin{aligned}
 & 0.00 * x(1) + 0.00 * x(2) + \\
 & 0.00 * x(3) + \\
 & 0.00 * y+(1) + 4.00 * y-(1) + \\
 & 2.00 * y+(2) + 0.00 * y-(2) + \\
 & 0.00 * y+(3) + 0.00 * y-(3) + \\
 & 0.00 * y+(4) + 0.00 * y-(4) \longrightarrow \text{MIN}
 \end{aligned}$$

Enter coefficients of the objective function in problem Z(2)

Defining problem Z(2)

Goal no.	x(1)	x(2)	x(3)	Expectations of the decision-maker	Deviation weights y(+)	y(-)	P
1	2.00	3.00	2.00	≥ 15.00	0.00	4.00	2
2	3.00	2.00	10.00	≤ 8.00	2.00	0.00	2
3	1.00	2.00	1.00	≥ 20.00	0.00	1.50	1
4	0.00	1.00	0.00	≤ 15.00	2.00	0.00	1

Value of the problem's objective function:

Z(1)= 17.25

Additional constraint

$$\begin{aligned}
 &0.00 * x(1) + 0.00 * x(2) + \\
 &0.00 * x(3) + \\
 &0.00 * y+(1) + 0.00 * y-(1) + \\
 &0.00 * y+(2) + 0.00 * y-(2) + \\
 &0.00 * y+(3) + 1.50 * y-(3) + \\
 &2.00 * y+(4) + 0.00 * y-(4) = 17.25
 \end{aligned}$$

Enter coefficients of the additional constraint in problem Z(2)



Problem Z(2)

x(1)	x(2)	x(3)	y+(1)	y-(1)	y+(2)	y-(2)	y+(3)	y-(3)	y+(4)	y-(4)	
Objective function											
0.0	0.0	0.0	0.0	4.0	2.0	0.0	0.0	0.0	0.0	0.0	—> min
Goal balancing											
2.0	3.0	2.0	-1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	= 15.0
3.0	2.0	10.0	0.0	0.0	-1.0	1.0	0.0	0.0	0.0	0.0	= 8.0
1.0	2.0	1.0	0.0	0.0	0.0	0.0	-1.0	1.0	0.0	0.0	= 20.0
0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0	1.0	= 15.0
Problem constraints											
2.0	3.0	2.0									≤ 15.0
2.0	1.0	2.0									≤ 15.0
1.0	-1.0	2.0									≥ 7.0
Additional constraints											
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	2.0	0.0	= 17.2

Value of the objective function = 37.00

PROGRAM GOAL  
Solving the problem

GOAL/10

Optimal solution

Values of variables		Values of objective functions		Deviations from target values		
Variable	Value	Pr.level	Value	Goal	y(+)	y(-)
x( 1)	4.50	1	17.25	1	0.00	0.00
x( 2)	2.00	2	37.00	2	18.50	0.00
x( 3)	1.13			3	0.00	11.50
				4	0.00	13.00