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Tableau (before adding artificial variable)

1	2	3	4	5	6	7	8	b
-1 -2 -2	1 -1 2	0 0 2 1	0 -1 1	1 0 0 0	0 1 0 0	0 0 -1 0	0 0 0 -1	2 4 4 6

(In addition, we must impose: Complementary Slackness: XV=0, YU=0 Nonnegativity: X≥0, Y≥0, U≥0, V≥0)

Variable numbers:

U: 3 4 (multipliers for Ax≤b constraints) V: 7 8 (multipliers for x≥0 constraints)

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## Pivot the primal slack & dual surplus variables into the basis:

1	2	3	4	5	6	7	8	b
2 -1 -2 2	1 1 2 -2	0 -2 -1	0 0 1 -1	1 0 0	0 1 0 0	0 0 1 0	0 0 0 1	2 -4 -6
***************************************			**********	*	*	*	*	

Not feasible! The dual surplus variables are negative.

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## TABLEAU with artificial variable included

1 2	3 4	5 6	7 8	а	b	
2 1 -1 1 -2 2 2 -2	0 0 0 0 -2 1 -1 -1	1 0 0 1 0 0 0 0	0 0 0 0 1 0 0 1	0 0 -1 -1	2 -4 -6	
		**	**	t	-art Var	ificial riable

The artificial variable has coefficient zero in feasible rows, and -1 in rows with infeasibility.

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1	2	3	4	5 6	7 8	а	b
2 -1 -2 2	1 1 2 -2	0 -2 -1	0 0 -1	1 0 0 1 0 0 0 0	0 0 0 0 1 0 0 1	(J.:00	2 4 -4 -6
				**	**		

Pivot the artificial variable into the basis, with the pivot in the row with maximum infeasibility

Artificial variable (a) enters the basis,

replacing variable 8, whose complement is variable 2

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-1 1 0 0 0 1 -4 4 -1 2 0 0 -2 2 1 1 0 0	1 0	0 -1 -1	0 0 0 1	2 4 2 6

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1 2	3 4	5 6	7 8	а	b
2 1 -1 1 -4 4 -2 2	0 0 0 0 -1 2 1 1	1 0 0 1 0 0 0 0	0 0 0 0 1 -1 0 -1	0 0 0 1	2 4 2 6
	•	**	*	*	

Entering: 2, Leaving: 7 (Pivot in row 3)

1 2	3	4	5	6	7	8	а	b
3 0 0 0 -1 1 0 0	0.25 0.25 -0.25 1.5	-0.5 -0.5 0.5 0	1 0 0	0 1 0 0	-0.25 -0.25 -0.25 -0.5	0.25 0.25 -0.25 -0.5	0 0 0 1	1.5 3.5 0.5 5

1 2	3	4	5 6	7	8	а	b
3 0 0 0 -1 1 0 0	0.25 0.25 -0.25 1.5	-0.5 -0.5 0.5 0	1 0 0 1 0 0 0 0	-0.25 -0.25 -0.25 -0.5	0.25 0.25 -0.25 -0.5	0 0 0 1	1.5 3.5 0.5 5
*			* *			*	

Entering: 1, Leaving: 5 (Pivot in row 1)

1 2	3	4	5	6	7	8	а	b
1 0	0.083	-0.166	0.333	0	-0.083	0.083	0	0.5
0 0	0.25	-0.5	0	1	-0.25	0.25	0	3.5
0 1	-0.166	0.333	0.333	0	0.166	-0.166	0	1
0 0	1.5	0	0	0	-0.5	-0.5	1	5

1	2	3	4	5	6	7	8	а	b
1 0 0 0	0 0 1 0	0.083 0.25 -0.166 1.5	-0.166 -0.5 0.333	0.333 0 0.333 0	0 1 0 0	-0.083 -0.25 0.166 -0.5	0.083 0.25 -0.166 -0.5	0 0 0 1	0.5 3.5 1 5
*	*				*			*	

Entering: 3, Leaving: 9 (Pivot in row 4)

1 2	3 4	5 6		7	8	а	b
1 0 0 0 0 1 0 0	0 <sup>-</sup> 0.166 0 <sup>-</sup> 0.5 0 0.333 1 0	0.333 0 0 1 0.333 0	1	-0.055 -0.166 0.111 -0.333	0.111 0.333 -0.222 -0.333	-0.055 -0.166 0.111 0.666	0.222 2.666 1.555 3.333

\*\* \* The artificial variable has left the basis!

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OPTIMAL SOLUTION

Primal Variables: x = 0.222222 1.55556 Slack: y = 0 2.66667 Dual Variables: u = 3.33333 0 Surplus: v = 0 0 Objective Function: -8.44444

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