

Linear problem:

Maximize $z = -8x_2 - 19x_3 - 12x_4$

subject to

$$x_1 + 4x_2 + 10x_3 + 4x_4 + x_5 \leq 16$$

$$-x_1 + 2x_2 + 5x_3 + 3x_4 = 7$$

$$7x_2 + 17x_3 + 8x_4 + x_5 = 26$$

$$(x_1, x_2, x_3, x_4, x_5) \geq 0 \text{ in } \mathbb{R}^5$$

Canonical problem:

Maximize $z = -8x_2 - 19x_3 - 12x_4$

subject to

$$x_1 + 4x_2 + 10x_3 + 4x_4 + x_5 + u_1 = 16$$

$$-x_1 + 2x_2 + 5x_3 + 3x_4 = 7$$

$$7x_2 + 17x_3 + 8x_4 + x_5 = 26$$

$$(x_1, x_2, x_3, x_4, x_5, u_1) \geq 0 \text{ in } \mathbb{R}^6$$

Phase 1 problem:

Maximize $z' = -y_1 - y_2$

subject to

$$x_1 + 4x_2 + 10x_3 + 4x_4 + x_5 + u_1 = 16$$

$$-x_1 + 2x_2 + 5x_3 + 3x_4 + y_1 = 7$$

$$7x_2 + 17x_3 + 8x_4 + x_5 + y_2 = 26$$

$(x_1, x_2, x_3, x_4, x_5, u_1, y_1, y_2) \geq 0$ in \mathbb{R}^8

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	1	4	10	4	1	1	0	0	16
y_1	-1	2	5	3	0	0	1	0	7
y_2	0	7	17	8	1	0	0	1	26
	0	0	0	0	0	0	1	1	0

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	1	4	10	4	1	1	0	0	16
y_1	-1	2	5	3	0	0	1	0	7
y_2	0	7	17	8	1	0	0	1	26
	0	0	0	0	0	0	1	1	0

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	1	4	10	4	1	1	0	0	16
y_1	-1	2	5	3	0	0	1	0	7
y_2	0	7	17	8	1	0	0	1	26
	1	-9	-22	-11	-1	0	0	0	-33



	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	1	4	10	4	1	1	0	0	16
y_1	-1	2	5	3	0	0	1	0	7
y_2	0	7	17	8	1	0	0	1	26
	1	-9	-22	-11	-1	0	0	0	-33

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	1	4	10	4	1	1	0	0	16
y_1	-1	2	5	3	0	0	1	0	7
y_2	0	7	17	8	1	0	0	1	26
	1	-9	-22	-11	-1	0	0	0	-33

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	1	4	10	4	1	1	0	0	16
\leftarrow	-1/2	1	5/2	3/2	0	0	1/2	0	7/2
y_2	0	7	17	8	1	0	0	1	26
	1	-9	-22	-11	-1	0	0	0	-33

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	3	0	0	-2	1	1	-2	0	2
x_2	-1/2	1	5/2	3/2	0	0	1/2	0	7/2
y_2	7/2	0	-1/2	-5/2	1	0	-7/2	1	3/2
	-7/2	0	1/2	5/2	-1	0	9/2	0	-3/2

 x_1 x_2 x_3 x_4 x_5 u_1 y_1 y_2 u_1

3

0

0

-2

1

1

-2

0

2

 x_2

-1/2

1

5/2

3/2

0

0

1/2

0

7/2

 y_2

7/2

0

-1/2

-5/2

1

0

-7/2

1

3/2

-7/2

0

1/2

5/2

-1

0

9/2

0

-3/2

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	3	0	0	-2	1	1	-2	0	2
x_2	-1/2	1	5/2	3/2	0	0	1/2	0	7/2
y_2	7/2	0	-1/2	-5/2	1	0	-7/2	1	3/2
	-7/2	0	1/2	5/2	-1	0	9/2	0	-3/2

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	3	0	0	-2	1	1	-2	0	2
x_2	-1/2	1	5/2	3/2	0	0	1/2	0	7/2
←	1	0	-1/7	-5/7	2/7	0	-1	2/7	3/7
	-7/2	0	1/2	5/2	-1	0	9/2	0	-3/2

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	0	0	$3/7$	$1/7$	$1/7$	1	1	$-6/7$	$5/7$
x_2	0	1	$17/7$	$8/7$	$1/7$	0	0	$1/7$	$26/7$
x_1	1	0	$-1/7$	$-5/7$	$2/7$	0	-1	$2/7$	$3/7$
	0	0	0	0	0	0	1	1	0

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	0	0	$3/7$	$1/7$	$1/7$	1	1	$-6/7$	$5/7$
x_2	0	1	$17/7$	$8/7$	$1/7$	0	0	$1/7$	$26/7$
x_1	1	0	$-1/7$	$-5/7$	$2/7$	0	-1	$2/7$	$3/7$
	0	8	19	12	0	0	0	0	0

Phase 2: $z = -8x_2 - 19x_3 - 12x_4$

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	0	0	$3/7$	$1/7$	$1/7$	1	1	$-6/7$	$5/7$
x_2	0	1	$17/7$	$8/7$	$1/7$	0	0	$1/7$	$26/7$
x_1	1	0	$-1/7$	$-5/7$	$2/7$	0	-1	$2/7$	$3/7$
	0	8	19	12	0	0	0	0	0

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	0	0	$3/7$	$1/7$	$1/7$	1	1	$-6/7$	$5/7$
x_2	0	1	$17/7$	$8/7$	$1/7$	0	0	$1/7$	$26/7$
x_1	1	0	$-1/7$	$-5/7$	$2/7$	0	-1	$2/7$	$3/7$
	0	0	$-3/7$	$20/7$	$-8/7$	0	0	$-8/7$	$-208/7$



	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	0	0	$3/7$	$1/7$	$1/7$	1	1	$-6/7$	$5/7$
x_2	0	1	$17/7$	$8/7$	$1/7$	0	0	$1/7$	$26/7$
x_1	1	0	$-1/7$	$-5/7$	$2/7$	0	-1	$2/7$	$3/7$
	0	0	$-3/7$	$20/7$	$-8/7$	0	0	$-8/7$	$-208/7$

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	0	0	$3/7$	$1/7$	$1/7$	1	1	$-6/7$	$5/7$
x_2	0	1	$17/7$	$8/7$	$1/7$	0	0	$1/7$	$26/7$
$\leftarrow x_1$	1	0	$-1/7$	$-5/7$	$2/7$	0	-1	$2/7$	$3/7$
	0	0	$-3/7$	$20/7$	$-8/7$	0	0	$-8/7$	$-208/7$

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	0	0	$3/7$	$1/7$	$1/7$	1	1	$-6/7$	$5/7$
x_2	0	1	$17/7$	$8/7$	$1/7$	0	0	$1/7$	$26/7$
\leftarrow	$7/2$	0	$-1/2$	$-5/2$	1	0	$-7/2$	1	$3/2$
	0	0	$-3/7$	$20/7$	$-8/7$	0	0	$-8/7$	$-208/7$

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	-1/2	0	1/2	1/2	0	1	3/2	-1	1/2
x_2	-1/2	1	5/2	3/2	0	0	1/2	0	7/2
x_5	7/2	0	-1/2	-5/2	1	0	-7/2	1	3/2
	4	0	-1	0	0	0	-4	0	-28



	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	-1/2	0	1/2	1/2	0	1	3/2	-1	1/2
x_2	-1/2	1	5/2	3/2	0	0	1/2	0	7/2
x_5	7/2	0	-1/2	-5/2	1	0	-7/2	1	3/2
	4	0	-1	0	0	0	-4	0	-28

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
$\leftarrow u_1$	-1/2	0	1/2	1/2	0	1	3/2	-1	1/2
x_2	-1/2	1	5/2	3/2	0	0	1/2	0	7/2
x_5	7/2	0	-1/2	-5/2	1	0	-7/2	1	3/2
	4	0	-1	0	0	0	-4	0	-28

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_2	-1	0	1	1	0	2	3	-2	1
x_5	-1/2	1	5/2	3/2	0	0	1/2	0	7/2
	7/2	0	-1/2	-5/2	1	0	-7/2	1	3/2
	4	0	-1	0	0	0	-4	0	-28

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	3	0	0	1	0	2	-1	-2	-27

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	3	0	0	1	0	2	-1	-2	-27

Optimal solution: $x = (0, 1, 1, 0, 2)$

Linear problem:

Maximize $z = -8x_2 - 19x_3 - 12x_4$

subject to

$$x_1 + 4x_2 + 10x_3 + 4x_4 + x_5 \leq 16$$

$$-x_1 + 2x_2 + 5x_3 + 3x_4 = 7$$

$$7x_2 + 17x_3 + 8x_4 + x_5 = 26$$

$x \geq 0$ in \mathbb{R}^5

New objective function: $\hat{z} = -8x_2 - 19x_3 - 10x_4$

Add $\Delta c_4 = 2$ to c_4 .

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	3	0	0	1	0	2	-1	-2	-27

Add $\Delta c_4 = 2$ to c_4 .

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	3	0	0	-1	0	2	-1	-2	-27

Add $\Delta c_4 = 2$ to c_4 .



	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	3	0	0	-1	0	2	-1	-2	-27



x_1 x_2 x_3 x_4 x_5 u_1 y_1 y_2

← x_3

-1	0	1	1	0	2	3	-2	1	
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	3	0	0	-1	0	2	-1	-2	-27

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_4	-1	0	1	1	0	2	3	-2	1
x_2	1	1	1	0	0	-3	-4	3	2
x_5	1	0	2	0	1	5	4	-4	4
	2	0	1	0	0	4	2	-4	-26

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_4	-1	0	1	1	0	2	3	-2	1
x_2	1	1	1	0	0	-3	-4	3	2
x_5	1	0	2	0	1	5	4	-4	4
	2	0	1	0	0	4	2	-4	-26

Optimal solution: $x = (0, 2, 0, 1, 4)$

Linear problem:

Maximize $z = -8x_2 - 19x_3 - 12x_4$

subject to

$$x_1 + 4x_2 + 10x_3 + 4x_4 + x_5 \leq 16$$

$$-x_1 + 2x_2 + 5x_3 + 3x_4 = 7$$

$$7x_2 + 17x_3 + 8x_4 + x_5 = 26$$

$x \geq 0$ in \mathbb{R}^5

New objective function: $\hat{z} = -10x_2 - 19x_3 - 12x_4$

Add $\Delta c_2 = -2$ to c_2 .

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	3	0	0	1	0	2	-1	-2	-27

Add $\Delta c_2 = -2$ to c_2 .

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	3	2	0	1	0	2	-1	-2	-27

Add $\Delta c_2 = -2$ to c_2 .

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	3	2	0	1	0	2	-1	-2	-27

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	-1	0	0	3	0	12	13	-12	-29

 x_1 x_2 x_3 x_4 x_5 u_1 y_1 y_2 x_3

-1

0

1

1

0

2

3

-2

1

 x_2

2

1

0

-1

0

-5

-7

5

1

 x_5

3

0

0

-2

1

1

-2

0

2

-1

0

0

3

0

12

13

-12

-29

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	-1	0	0	3	0	12	13	-12	-29

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_5	1	1/2	0	-1/2	0	-5/2	-7/2	5/2	1/2
	3	0	0	-2	1	1	-2	0	2
	-1	0	0	3	0	12	13	-12	-29

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	0	1/2	1	1/2	0	-1/2	-1/2	1/2	3/2
x_1	1	1/2	0	-1/2	0	-5/2	-7/2	5/2	1/2
x_5	0	-3/2	0	-1/2	1	17/2	17/2	-15/2	1/2
	0	1/2	0	5/2	0	19/2	19/2	-19/2	-57/2

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	0	1/2	1	1/2	0	-1/2	-1/2	1/2	3/2
x_1	1	1/2	0	-1/2	0	-5/2	-7/2	5/2	1/2
x_5	0	-3/2	0	-1/2	1	17/2	17/2	-15/2	1/2
	0	1/2	0	5/2	0	19/2	19/2	-19/2	-57/2

Optimal solution: $x = (\frac{1}{2}, 0, \frac{3}{2}, 0, \frac{1}{2})$

Linear problem:

Maximize $z = -8x_2 - 19x_3 - 12x_4$

subject to

$$x_1 + 4x_2 + 10x_3 + 4x_4 + x_5 \leq 16$$

$$-x_1 + 2x_2 + 5x_3 + 3x_4 = 7$$

$$7x_2 + 17x_3 + 8x_4 + x_5 = 26$$

$x \geq 0$ in \mathbb{R}^5

New first constraint: $x_1 + 4x_2 + 10x_3 + 4x_4 + x_5 \leq 18$

Add $\Delta b_1 = 2$ to b_1 .

Add $2e_1$ to constant column of initial tableau.

Add $2B^{-1}e_1$ to constant column of final tableau.

Phase 1 initial tableau:

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	1	4	10	4	1	1	0	0	16
y_1	-1	2	5	3	0	0	1	0	7
y_2	0	7	17	8	1	0	0	1	26
	1	-9	-22	-11	-1	0	0	0	-33

Initial basic variables: u_1, y_1, y_2

$B^{-1}e_1 =$ column of u_1 in final tableau of Phase 2.

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	3	0	0	1	0	2	-1	-2	-27

Column of u_1 : $\begin{bmatrix} 2 \\ -5 \\ 1 \\ 2 \end{bmatrix}$ Add $2 \begin{bmatrix} 2 \\ -5 \\ 1 \\ 2 \end{bmatrix}$ to constant column.

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	5
x_2	2	1	0	-1	0	-5	-7	5	-9
x_5	3	0	0	-2	1	1	-2	0	4
	3	0	0	1	0	2	-1	-2	-23

Column of u_1 : $\begin{bmatrix} 2 \\ -5 \\ 1 \\ 2 \end{bmatrix}$ Add $2 \begin{bmatrix} 2 \\ -5 \\ 1 \\ 2 \end{bmatrix}$ to constant column.

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	5
$\leftarrow x_2$	2	1	0	-1	0	-5	-7	5	-9
x_5	3	0	0	-2	1	1	-2	0	4
	3	0	0	1	0	2	-1	-2	-23

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	5
x_2	2	1	0	-1	0	-5	-7	5	-9
x_5	3	0	0	-2	1	1	-2	0	4
	3	0	0	1	0	2	-1	-2	-23

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	5
\leftarrow	-2/5	-1/5	0	1/5	0	1	7/5	-1	9/5
x_5	3	0	0	-2	1	1	-2	0	4
	3	0	0	1	0	2	-1	-2	-23

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	$-1/5$	$2/5$	1	$3/5$	0	0	$1/5$	0	$7/5$
u_1	$-2/5$	$-1/5$	0	$1/5$	0	1	$7/5$	-1	$9/5$
x_5	$17/5$	$1/5$	0	$-11/5$	1	0	$-17/5$	1	$11/5$
	$19/5$	$2/5$	0	$3/5$	0	0	$-19/5$	0	$-133/5$

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1/5	2/5	1	3/5	0	0	1/5	0	7/5
u_1	-2/5	-1/5	0	1/5	0	1	7/5	-1	9/5
x_5	17/5	1/5	0	-11/5	1	0	-17/5	1	11/5
	19/5	2/5	0	3/5	0	0	-19/5	0	-133/5

Optimal solution: $x = (0, 0, \frac{7}{5}, 0, \frac{11}{5})$

Linear problem:

Maximize $z = -8x_2 - 19x_3 - 12x_4$

subject to

$$x_1 + 4x_2 + 10x_3 + 4x_4 + x_5 \leq 16$$

$$-x_1 + 2x_2 + 5x_3 + 3x_4 = 7$$

$$7x_2 + 17x_3 + 8x_4 + x_5 = 26$$

$x \geq 0$ in \mathbb{R}^5

New second constraint: $-x_1 + 2x_2 + 5x_3 + 3x_4 = 13/2$

Add $\Delta b_2 = -\frac{1}{2}$ to b_2 .

Add $-\frac{1}{2}e_2$ to constant column of initial tableau.

Add $-\frac{1}{2}B^{-1}e_2$ to constant column of final tableau.

Phase 1 initial tableau:

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
u_1	1	4	10	4	1	1	0	0	16
y_1	-1	2	5	3	0	0	1	0	7
y_2	0	7	17	8	1	0	0	1	26
	1	-9	-22	-11	-1	0	0	0	-33

Initial basic variables: u_1, y_1, y_2

$B^{-1}e_2 =$ column of y_1 in final tableau of Phase 2.

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	1
x_2	2	1	0	-1	0	-5	-7	5	1
x_5	3	0	0	-2	1	1	-2	0	2
	3	0	0	1	0	2	-1	-2	-27

Column of y_1 : $\begin{bmatrix} 3 \\ -7 \\ -2 \\ -1 \end{bmatrix}$ Add $-\frac{1}{2} \begin{bmatrix} 3 \\ -7 \\ -2 \\ -1 \end{bmatrix}$ to constant column.

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_3	-1	0	1	1	0	2	3	-2	-1/2
x_2	2	1	0	-1	0	-5	-7	5	9/2
x_5	3	0	0	-2	1	1	-2	0	3
	3	0	0	1	0	2	-1	-2	-53/2

Column of y_1 : $\begin{bmatrix} 3 \\ -7 \\ -2 \\ -1 \end{bmatrix}$ Add $-\frac{1}{2} \begin{bmatrix} 3 \\ -7 \\ -2 \\ -1 \end{bmatrix}$ to constant column.

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
$\leftarrow x_3$	-1	0	1	1	0	2	3	-2	-1/2
x_2	2	1	0	-1	0	-5	-7	5	9/2
x_5	3	0	0	-2	1	1	-2	0	3
	3	0	0	1	0	2	-1	-2	-53/2

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
$\leftarrow x_3$	-1	0	1	1	0	2	3	-2	-1/2
x_2	2	1	0	-1	0	-5	-7	5	9/2
x_5	3	0	0	-2	1	1	-2	0	3
	3	0	0	1	0	2	-1	-2	-53/2

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
	1	0	-1	-1	0	-2	-3	2	$1/2$
x_2	2	1	0	-1	0	-5	-7	5	$9/2$
x_5	3	0	0	-2	1	1	-2	0	3
	3	0	0	1	0	2	-1	-2	$-53/2$

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_1	1	0	-1	-1	0	-2	-3	2	1/2
x_2	0	1	2	1	0	-1	-1	1	7/2
x_5	0	0	3	1	1	7	7	-6	3/2
	0	0	3	4	0	8	8	-8	-28

	x_1	x_2	x_3	x_4	x_5	u_1	y_1	y_2	
x_1	1	0	-1	-1	0	-2	-3	2	1/2
x_2	0	1	2	1	0	-1	-1	1	7/2
x_5	0	0	3	1	1	7	7	-6	3/2
	0	0	3	4	0	8	8	-8	-28

Optimal solution: $x = (\frac{1}{2}, \frac{7}{2}, 0, 0, \frac{3}{2})$