

Работа №2

$F_{\min} = -(-F)_{\max} = -F'_{\max}$

a)  $F = -8x_1 + 3x_2 \rightarrow \min(\max)$

$$\begin{cases} x_1 + 2x_2 \leq 14 \\ -4x_1 + 3x_2 \leq 12 \\ x_1 \leq 6 \\ x_1 \geq 0, \quad x_2 \geq 0 \end{cases}$$

$$\begin{cases} x_1 + 2x_2 + x_3 = 14 \\ -4x_1 + 3x_2 + x_4 = 12 \\ x_1 + x_5 = 6 \\ x_i \geq 0, i = \overline{1,5} \end{cases}$$

	c	-8	3	0	0	0	0	
Basis	C base	x0	x1	x2	x3	x4	B	reduced_cost
A2	0	1	2	1	0	0	14	7
A3	0	-4	3	0	1	0	12	4
A4	0	1	0	0	0	1	6	$\infty$
	delta	-8	3	0	0	0	0	

	c	-8	3	0	0	0	0
Basis	C base	x0	x1	x2	x3	x4	B
A2	0	3.66667	0	1	-0.666667	0	6
A1	3.0	-1.33333	1	0	0.333333	0	4
A4	0	1	0	0	0	1	6
	delta	-4	0	0	-1	0	12

$x_1 = 14 - 2x_2 - x_3 = 14 - 2 \cdot 4 - 6 = 0, \quad F_{\max} = F(0, 4) = 12$

Basis	C base	x0	x1	x2	x3	x4	B	reduced_cost
A2	0	1	2	1	0	0	14	14
A3	0	-4	3	0	1	0	12	-3
A4	0	1	0	0	0	1	6	6
	delta	8	-3	0	0	0	0	
	c	8	-3	0	0	0	0	

Таблица 1: Таблица с данными и столбцом reduced\_cost.

Basis	C base	x0	x1	x2	x3	x4	B
A2	0	0	2	1	0	-1	8
A3	0	0	3	0	1	4	36
A0	8.0	1	0	0	0	1	6
	delta	0	-3	0	0	-8	48
	c	8	-3	0	0	0	0

Таблица 2: Таблица с данными без столбца reduced\_cost.

$$x_1 + x_3 = 14 \quad \Rightarrow \quad x_2 = 0$$

$$F_{\min} = F(6, 0) = -48$$

**b)**  $F = 2x_1 + x_2 \rightarrow \min(\max)$

$$\begin{cases} 2x_1 + x_2 \geq 10 \\ -4x_1 + x_2 \leq 8 \\ x_1 \geq 0, \quad x_2 \geq 0 \end{cases}$$

$$\begin{cases} -2x_1 - x_2 + x_3 = -10 \\ -4x_1 + x_2 + x_4 = 8 \\ x_i \geq 0, i = \overline{1, 4} \end{cases}$$

Basis	C base	x0	x1	x2	x3	B	reduced_cost
A2	0	-2	-1	1	0	-10	5
A3	0	-4	1	0	1	8	-2
	delta	2	1	0	0	0	
	c	2	1	0	0	0	

$$\exists \delta_j > 0 : \forall x_{ij} < 0 \Rightarrow \nexists F_{\max}$$

Basis	C base	x0	x1	x2	x3	B
A2	0	-2	-1	1	0	-10
A3	0	-4	1	0	1	8
	delta	-2	-1	0	0	0

Basis	C base	x0	x1	x2	x3	B
A0	-2	1	0.5	-0.5	0	5
A3	0	0	3	-2	1	28
	delta	0	0	-1	0	10

$\Rightarrow$  Задача имеет бесконечное множество оптимальных решений

$$F_{\min} = F(5, 0) = 10$$

**c)**  $F = 2x_1 - x_2 \rightarrow \min(\max)$

$$\begin{cases} 3x_1 - x_2 \geq 21 \\ x_1 \leq 2 \\ x_1 \geq 0, \quad x_2 \geq 0 \end{cases}$$

$$\begin{cases} 3x_1 - x_2 - x_3 = 21 \\ x_1 + x_4 = 2 \\ x_i \geq 0, i = \overline{1, 4} \end{cases}$$

Basis	C base	x1	x2	x3	x4	B	r
A3	0	-3	1	1	0	-21	7
A4	0	1	0	0	1	2	2
	delta	2	-1	0	0	0	

Basis	C base	x1	x2	x3	x4	B
A3	0	0	1	1	3	-15
A1	2	1	0	0	1	2
	delta	0	-1	0	-2	-4

$$(\forall j : \delta_j \leq 0) \quad \& \quad F < 0 \quad \Rightarrow \quad D = \emptyset$$

$$\nexists F_{\min}, \quad \nexists F_{\max}$$