№3 [2.1] (1.10)

$$U(x) = 100x_1 + 120x_2 + 70x_3 + 30x_4 \to min;$$

$$\begin{cases} 0,3x_1 + 0,1x_2 + 0,4x_3 + 0,4x_4 = 0,675 \cdot 800; \\ 0,2x_1 + 0,1x_2 + 0,2x_3 + 0,3x_4 = 0,425 \cdot 800; \\ x_j \geq 0;\ j = \overline{1..4}; \end{cases}$$

$$Q(x) = 100x_1 + 120x_2 + 70x_3 + 30x_4 \to min;$$

$$\begin{cases} 3x_1 + x_2 + 4x_3 + 4x_4 = 5400; \\ 2x_1 + x_2 + 2x_3 + 3x_4 = 3400; \\ x_j \geq 0;\ j = \overline{1..4}; \end{cases}$$

$$\left(\begin{array}{cccc|c} 3 & 1 & 4 & 4 & 5400 \\ 2 & 1 & 2 & 3 & 3400 \end{array}\right) \begin{matrix} \\ \times(-1) \end{matrix} \sim \left(\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 2000 \\ 2 & 1 & 2 & 3 & 3400 \end{array}\right) \begin{matrix} \times(-2) \\ \oplus \end{matrix} \sim \left(\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 2000 \\ 0 & 1 & -2 & 1 & -600 \end{array}\right)$$

$$\begin{cases} x_1 + 2x_3 + x_4 = 2000; \\ x_2 - 2x_3 + x_4 = -600; \end{cases} \quad \begin{cases} x_1 = 2000 - 2x_3 - x_4; \\ x_2 = -600 + 2x_3 - x_4; \end{cases}$$

$$Z = 100(2000 - 2x_3 - x_4) + 120(-600 + 2x_3 - x_4) + 70x_3 + 30x_4 \to min;$$

$$\begin{cases} 2x_3 + x_4 \leq 2000; \\ -2x_3 + x_4 \leq -600; \end{cases}$$

$$Z = 200000 - 200x_3 - 100x_4 - 72000 + 240x_3 - 120x_4 + 70x_3 + 30x_4 \to min;$$

$$Z = 110x_3 - 190x_4 + 128000 \to min;$$

$$\begin{cases} -2x_3 - x_4 \geq -2000; \\ 2x_3 - x_4 \geq +600; \\ x_3, x_4 \geq 0. \end{cases}$$

Лаб №2

№1. [1.1]

(1.2) $\varphi = 15x_1 + 30x_2 \to max$; $\varphi - 15x_1 + 30x_2 + 0x_3 + 0x_4 + 0x_5 \to max$

$$\begin{cases} 3x_1 + 0x_2 \le 60 \\ x_2 + x_1 \le 50; \\ 2x_1 + x_2 \le 80 \\ x_1, x_2 \ge 0 \end{cases} \longrightarrow \begin{cases} 3x_1 + x_3 = 60; \\ x_1 + x_2 + x_4 = 50; \\ 2x_1 + x_2 + x_5 = 80; \\ x_1, x_2, x_3, x_4, x_5 \ge 0; \end{cases}$$

(1.14) $\varphi(x) = 10x_1 + 25x_3 + 27x_4 + 17x_5 + 7x_6 \to min$

$$\begin{cases} 2x_1 + x_2 + x_3 \ge 40; \\ x_2 + 2x_4 + x_5 \ge 36; \\ x_3 + x_5 + 2x_6 \ge 20; \\ x_j \ge 0; \ j = \overline{1..6}; \end{cases} \qquad \begin{cases} 2x_1 + x_2 + x_3 - x_7 = 40; \\ x_2 + 2x_4 + x_5 - x_8 = 36; \\ x_3 + x_5 + 2x_6 - x_9 = 20; \\ x_j \ge 0; \ j = \overline{1..9}. \end{cases}$$

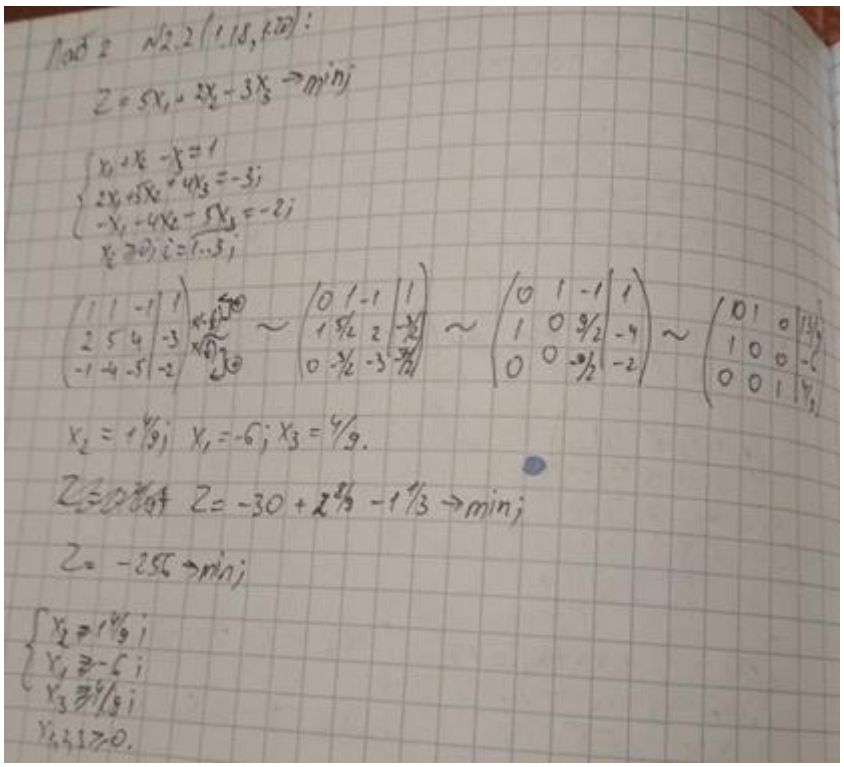
$\downarrow$

$\varphi(x) = 10x_1 + 25x_3 + 27x_4 + 17x_5 + 7x_6 + 0x_7 + 0x_8 + 0x_9 \to min$

№2 [1.2] (1.20)

$\varphi = x - 3x_2 - 3x_3 \to max$; $\varphi = x - 3x_2 - 3x_3' + 3x_3'' + 0x_5 + 0x_6$

$$\begin{cases} 2x_1 - x_2 + x_3 \ge 1 \\ 4x_1 - 2x_2 + x_3 \ge -2 \\ 3x_1 + x_3 \le 1 \\ x_j \ge 0, \ j = 1,2. \end{cases} \longrightarrow \begin{cases} 2x_1 - x_2 + x_3' - x_3'' - x_4 = 1; \\ 4x_1 - 2x_2 + x_3' - x_3'' - x_5 = -2; \\ 3x_1 + x_3' - x_3'' + x_6 = 1 \\ x_j \ge 0, \ j = 1,2,4,5,6; \ x_3' \ge 0, x_3'' \end{cases}$$



Под 2 №2.2 (1.18, 1.19):

$Z = 5x_1 + 2x_2 - 3x_3 \to min;$

$$\begin{cases} x_1 + x_2 - x_3 = 1 \\ 2x_1 + 5x_2 + 4x_3 = -3; \\ -x_1 - 4x_2 - 5x_3 = -2; \end{cases}$$

$x_i \geq 0;\ i = \overline{1..3};$

$$\begin{pmatrix} 1 & 1 & -1 & 1 \\ 2 & 5 & 4 & -3 \\ -1 & -4 & -5 & -2 \end{pmatrix} \sim \begin{pmatrix} 0 & 1 & -1 & 1 \\ 1 & 5/2 & 2 & -3/2 \\ 0 & -3/2 & -3 & -7/2 \end{pmatrix} \sim \begin{pmatrix} 0 & 1 & -1 & 1 \\ 1 & 0 & 9/2 & -4 \\ 0 & 0 & -9/2 & -2 \end{pmatrix} \sim \begin{pmatrix} 0 & 1 & 0 & 1\frac{1}{9} \\ 1 & 0 & 0 & -6 \\ 0 & 0 & 1 & 4/9 \end{pmatrix}$$

$x_2 = 1\frac{1}{9};\ x_1 = -6;\ x_3 = 4/9.$

$Z = -30 + 2\frac{2}{3} - 1\frac{1}{3} \to min;$

$Z = -256 \to min;$

$$\begin{cases} x_2 = 1\frac{1}{9}; \\ x_1 = -6; \\ x_3 = 4/9; \\ x_{4;11} \geq 0. \end{cases}$$