ДЗ # 10

Задача # 1

$$\begin{cases} x_1 + x_2 - x_3 + x_4 - 2x_5 = -11 \\ x_1 + 2x_2 - x_4 - 2x_5 = -58 \\ x_2 + 2x_3 - 3x_4 + x_5 = -62 \\ -x_1 - 5x_2 - 5x_3 + 9x_4 = 229 \\ x_1 - 3x_3 + 4x_4 - 3x_5 = 51 \end{cases}$$

$$\left|\begin{array}{ccccc|c} 1 & 1 & -1 & 1 & -2 & -11 \\ 1 & 2 & 0 & -1 & -2 & -58 \\ 0 & 1 & 2 & -3 & 1 & -62 \\ -1 & -5 & -5 & 9 & 0 & 229 \\ 1 & 0 & -3 & 4 & -3 & 51 \end{array}\right| \sim \left|\begin{array}{ccccc|c} 1 & 1 & -1 & 1 & -2 & -11 \\ 0 & 1 & 1 & -2 & 0 & -47 \\ 0 & 1 & 2 & -3 & 1 & -62 \\ 0 & -4 & -6 & 10 & -2 & 218 \\ 0 & -1 & -2 & 3 & -1 & 62 \end{array}\right| \sim$$

$$\left|\begin{array}{ccccc|c} 1 & 0 & -2 & 3 & -2 & 36 \\ 0 & 1 & 1 & -2 & 0 & -47 \\ 0 & 0 & 1 & -1 & 1 & -15 \\ 0 & 0 & -2 & 2 & -2 & 30 \\ 0 & 0 & -1 & 1 & -1 & 15 \end{array}\right| \sim \left|\begin{array}{ccccc|c} 1 & 0 & 0 & 1 & 0 & 6 \\ 0 & 1 & 0 & -1 & -1 & -32 \\ 0 & 0 & 1 & -1 & 1 & -15 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right|$$

$$\begin{cases} x_1 + x_4 = 6 \\ x_2 - x_4 - x_5 = -32 \\ x_3 - x_4 + x_5 = -15 \\ x_4 = 0 \\ x_5 = 0 \end{cases} \Rightarrow x_4 = x_5 = 0 \; ; \quad x_3 = -15 ; \; x_2 = -32 ; \; x_1 = 6$$

Задача #2

$$\begin{cases} x_1 - x_2 + 2x_3 - 2x_4 + 4x_5 = -1 \\ x_1 - 2x_4 + 5x_5 = -12 \\ -2x_1 + x_3 + 3x_4 - 8x_5 = 21 \\ 2x_1 + x_2 - 3x_3 - 3x_4 + 9x_5 = -32 \\ -x_2 + 2x_3 - x_5 = 11 \end{cases}$$

$$\left|\begin{array}{ccccc|c} 1 & -1 & 2 & -2 & 4 & -1 \\ 1 & 0 & 0 & -2 & 5 & -12 \\ -2 & 0 & 1 & 3 & -8 & 21 \\ 2 & 1 & -3 & -3 & 9 & -32 \\ 0 & -1 & 2 & 0 & -1 & 11 \end{array}\right| \sim \left|\begin{array}{ccccc|c} 1 & -1 & 2 & -2 & 4 & -1 \\ 0 & 1 & -2 & 0 & 1 & -11 \\ 0 & -2 & 5 & -1 & 0 & 19 \\ 0 & 3 & -7 & 1 & 1 & -30 \\ 0 & -1 & 2 & 0 & -1 & 11 \end{array}\right| \sim$$

$$\left|\begin{array}{ccccc|c} 1 & 0 & 0 & -2 & 5 & -12 \\ 0 & 1 & -2 & 0 & 1 & -11 \\ 0 & 0 & 1 & -1 & 2 & -3 \\ 0 & 0 & -1 & 1 & -2 & 3 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right| \sim \left|\begin{array}{ccccc|c} 1 & 0 & 0 & -2 & 5 & -12 \\ 0 & 1 & 0 & -2 & 5 & -17 \\ 0 & 0 & 1 & -1 & 2 & -3 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right|$$

$$\begin{cases} x_1 - 2x_4 + 5x_5 = -12 \\ x_4 = p_1 \\ x_2 - 2x_4 + 5x_5 = -17 \\ x_5 = p_2 \\ x_3 - x_4 + 2x_5 = -3 \end{cases} \Rightarrow$$

$Z_5[-12, -17, 3, 0, 0]$

$Z_1[-17, -22, -5, 0, 1]$

$Z_2[-10, -15, -2, 1, 0]$

$Z_3[-15, -20, -4, 1, 1]$

$Z_4[-19, -23, -6, -1, 1]$

Задача # 3

$$\begin{cases} x_1 + x_2 - x_3 - x_4 + x_5 = -46 \\ -x_1 + x_3 = 26 \\ -x_1 + 2x_3 - x_4 - x_5 = 33 \\ x_1 - 3x_3 + 2x_4 + 2x_5 = -40 \\ -2x_1 - x_2 + 6x_3 - 3x_4 - 5x_5 = 100 \end{cases}$$

$$\left|\begin{array}{ccccc|c} 1 & 1 & -1 & -1 & 1 & -46 \\ -1 & 0 & 1 & 0 & 0 & 26 \\ -1 & 0 & -1 & -1 & -1 & 33 \\ 1 & 0 & -3 & 2 & 2 & -40 \\ -2 & -1 & 6 & -3 & -5 & 100 \end{array}\right| \sim \left|\begin{array}{ccccc|c} 1 & 0 & 0 & 0 & 0 & -26 \\ 0 & 1 & 0 & 0 & 2 & -27 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 & -7 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right|$$

$$\begin{cases} x_1 = -26 \\ x_2 + 2x_5 = -27 \\ x_3 = 0 \\ x_4 = p \end{cases} \Rightarrow$$

$z_1[-26, -27, 0, -7, 0]$

$z_2[-26, -29, 0, -8, 1]$

$z_3[-26, -25, 0, -6, -1]$

$z_4[-26, -31, 0, -9, 2]$

$z_5[-26, -23, 0, -5, 2]$

Задача # 4

$$\begin{cases} x_1 - 2x_2 - 4x_3 - 2x_4 + 9x_5 = 0 \\ -x_1 + 3x_2 + 5x_3 + x_4 - 14x_5 = 0 \\ -x_1 + 2x_2 + 5x_3 + 3x_4 - 10x_5 = 0 \\ -2x_2 - x_3 + 3x_4 + 9x_5 = 0 \\ 2x_1 - 3x_2 - 10x_3 - 8x_4 + 16x_5 = 0 \end{cases}$$

$$\left|\begin{array}{ccccc} 1 & -2 & -4 & -2 & 9 \\ -1 & 3 & 5 & 1 & -14 \\ -1 & 2 & 5 & 3 & -10 \\ 0 & -2 & -1 & 3 & 9 \\ 2 & -3 & -10 & -8 & 16 \end{array}\right| \sim \left|\begin{array}{ccccc} x_1 & x_2 & x_3 & x_4 & x_5 \\ 1 & -2 & -4 & -2 & 9 \\ 0 & 1 & 1 & -1 & -5 \\ 0 & 0 & 1 & 1 & -1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right|$$

$$\begin{cases} x_1 - 2x_2 - 4x_3 - 2c_1 + 9c_2 = 0 \\ x_2 + x_3 - c_1 - 5c_2 = 0 \\ x_3 + c_1 - c_2 = 0 \end{cases} \Rightarrow \begin{array}{l} x_1 = 2c_1 + 3c_2 \\ x_2 = 2c_1 + 4c_2 \\ x_3 = -1c_1 + 1c_2 \\ x_4 = 1c_1 + 0c_2 \\ x_5 = 0c_1 + 1c_2 \end{array}$$

Задача #5

$x_1 = [-3, -4, -1, -2, 1]^T$

$x_2 = [-2, -6, 1, -3, 0]^T$

$x_3 = [-5, 1, -6, 1, 2]^T$

$x_4 = [-5, 0, -4, -2, 5]^T$

~~$x_5 = [$~~

$x_5 = x_1 - x_2 + x_3 = [-6, 3, -8, 2, 3]^T$

$x_6 = x_1 - x_2 + x_4 = [-6, 2, -6, -1, 6]^T$

$x_7 = x_1 - x_3 + x_4 = [-3, -5, 1, -5, 4]^T$

$x_8 = x_2 - x_3 + x_4 = [-2, -7, 3, -6, 3]^T$

Задача #6

$b_1, \dots b_5$ - ?

$$\begin{cases} x_1 - 2x_2 + 3x_3 - x_4 + 2x_5 = b_1 \\ -x_1 + 3x_2 - 4x_3 - 3x_5 = b_2 \\ -3x_1 + 7x_2 - 9x_3 + x_4 - 8x_5 = b_3 \\ x_1 - 2x_2 + 3x_3 - x_4 + 2x_5 = b_4 \\ 8x_1 - 19x_2 + 25x_3 - 3x_4 + 21x_5 = b_5 \end{cases}$$

$$\left|\begin{array}{ccccc|c} 1 & -2 & 3 & -1 & 2 & b_1 \\ -1 & 3 & -4 & 0 & -3 & b_2 \\ -3 & 7 & -9 & 1 & -8 & b_3 \\ 1 & -2 & 3 & -1 & 2 & b_4 \\ 8 & -19 & 25 & -3 & 21 & b_5 \end{array}\right| \sim \left|\begin{array}{ccccc|c} 1 & 0 & 1 & -3 & 0 & b_1 - b_3 + 3b_2 \\ 0 & 1 & 0 & -2 & -2 & 3b_1 + b_3 \\ 0 & 0 & 1 & -1 & -1 & 2b_1 + b_3 - b_2 \\ 0 & 0 & 0 & 0 & 0 & b_4 - b_1 \\ 0 & 0 & 0 & 0 & 0 & b_5 - b_1 + 2b_3 + b_2 \end{array}\right|$$

$$\begin{cases} b_4 - b_1 = 0 \\ b_5 - b_1 + 2b_3 + b_2 = 0 \end{cases} \Rightarrow$$

$b_1 = 0 \quad b_2 = 0 \quad b_3 = 1 \quad b_4 = 0 \quad b_5 = -2$

$b_1 = 0 \quad b_2 = 1 \quad b_3 = 0 \quad b_4 = 0 \quad b_5 = -1$

$b_1 = 1 \quad b_2 = 0 \quad b_3 = 0 \quad b_4 = 1 \quad b_5 = 1$