

Zad. Rozwiązać równanie

$$\begin{bmatrix} 1 & 2 & 1 \\ 0 & 0 & 1 \\ 0 & -1 & 1 \end{bmatrix} \cdot X = \begin{bmatrix} 1 & 0 & 3 \\ 0 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix}$$

$$A \cdot X = B$$

$$X = A^{-1} \cdot B$$

$$X = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 0 & 1 \\ 0 & -1 & 1 \end{bmatrix}^{-1} \cdot \begin{bmatrix} 1 & 0 & 3 \\ 0 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix}$$

A

$$\det A = \begin{vmatrix} 1 & 2 & 1 \\ 0 & 0 & 1 \\ 0 & -1 & 1 \end{vmatrix} = 1(-1)^{2+3} \begin{vmatrix} 1 & 2 \\ 0 & -1 \end{vmatrix} = 1 \neq 0$$

$$d_{11} = (-1)^2 \begin{vmatrix} 0 & 1 \\ -1 & 1 \end{vmatrix} = 1$$

$$d_{12} = (-1)^3 \begin{vmatrix} 0 & 1 \\ 0 & 1 \end{vmatrix} = 0$$

$$d_{13} = (-1)^4 \begin{vmatrix} 0 & 0 \\ 0 & 1 \end{vmatrix} = 0$$

$$d_{21} = (-1)^3 \begin{vmatrix} 2 & 1 \\ -1 & 1 \end{vmatrix} = -3$$

$$d_{22} = (-1)^4 \begin{vmatrix} 1 & 1 \\ 0 & 1 \end{vmatrix} = 1$$

$$d_{23} = (-1)^5 \begin{vmatrix} 1 & 2 \\ 0 & -1 \end{vmatrix} = 1$$

$$d_{31} = (-1)^7 \begin{vmatrix} 2 & 1 \\ 0 & 1 \end{vmatrix} = 2$$

$$d_{32} = (-1)^5 \begin{vmatrix} 1 & 1 \\ 0 & 1 \end{vmatrix} = -1$$

$$d_{33} = (-1)^6 \begin{vmatrix} 1 & 2 \\ 0 & 0 \end{vmatrix} = 0$$

$$X = 1 \cdot \begin{bmatrix} 1 & 0 & 0 \\ -3 & 1 & 1 \\ 2 & -1 & 0 \end{bmatrix}^T \cdot \begin{bmatrix} 1 & 0 & 3 \\ 0 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix} = \begin{bmatrix} 1 & -3 & 2 \\ 0 & 1 & -1 \\ 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} 1 & 0 & 3 \\ 0 & 0 & 1 \\ 0 & 2 & -1 \end{bmatrix} = \begin{bmatrix} 1 & 4 & -2 \\ 0 & -2 & 2 \\ 0 & 0 & 1 \end{bmatrix}$$