**Exercise 1.** Solve the following matrix equation:

$$\begin{bmatrix} 1 & 3 \\ -2 & -4 \end{bmatrix}^{T} \cdot \begin{bmatrix} 1 & -2 \\ 3 & -4 \end{bmatrix}^{-1} - 3X = 2 \cdot \left( X + \begin{bmatrix} -3 & -5 \\ 2 & 4 \end{bmatrix}^{-1} \right).$$

**Exercise 2.** Calculate the determinant $\begin{vmatrix} 3 & 2 & 3 \\ -2 & 4 & 1 \\ -1 & -5 & 2 \end{vmatrix}$ using:

a) the Sarrus method
b) the Laplace theorem

**Exercise 3.** Find the inverse of $\mathrm{A} = \begin{bmatrix} -2 & 1 & 1 \\ 3 & -4 & 2 \\ 6 & 3 & 5 \end{bmatrix}$.

**Exercise 4.** Calculate the determinant of matrix *A* using the Gaussian method:

$$A = \begin{bmatrix} 3 & 2 & -5 & 2 \\ 1 & -2 & -1 & 4 \\ -2 & 1 & 3 & -1 \\ -1 & 1 & 2 & 7 \end{bmatrix}.$$