1. Let

$$A = \begin{bmatrix} 3 & -2 \\ 2 & 1 \\ 3 & 4 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 1 & 2 \\ 2 & 3 \\ -1 & 2 \end{bmatrix}$$

Find $A + B$ and $A - B$.

2. Let

$$A = \begin{bmatrix} -3 & 1 \\ 0 & -3 \\ -1 & 1 \\ 2 & -2 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 1 & -2 & 2 & 3 \\ -1 & 2 & 0 & 4 \end{bmatrix}$$

(a) Find A^{T} and B^{T};

(b) Compute AB.

3. Find the inverse of the 2×2-matrix

$$\begin{bmatrix} 7 & -10 \\ -11 & 18 \end{bmatrix}$$

4. Matrices are useful in computer graphics. For instance, let a point (x, y) be represented as a column vector

$$\begin{bmatrix} x \\ y \end{bmatrix}.$$

Then the product

$$\begin{bmatrix} x \\ y \end{bmatrix} \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix} \tag{$\star$}$$

rotates the point (x, y) clockwise through an angle θ with respect to the x-axis. Here sin and cos are trigonometric functions.

Let us consider a rectangle whose corners are at xy-coordinates $(0, 0)$, $(0, 2)$, $(4, 0)$, $(4, 2)$. Describe what happens to these points in rotation $(\star)$, when $\theta = 60°$.