

Matrices

Problem 1. Let $A = \begin{pmatrix} 1 & 9 & -2 & 3 \\ 2 & 3 & 0 & 1 \\ 1 & 1 & 1 & 1 \end{pmatrix}$, $B = \begin{pmatrix} -1 & -4 & 3 & 1 \\ 2 & 1 & 0 & 0 \\ 3 & 1 & -2 & 1 \end{pmatrix}$. Calculate:

- a) $A+B$ b) $2A-3B$ c) $B.B^T$ d) $B^T.B$.

Results:

a) $\begin{pmatrix} 0 & 5 & 1 & 4 \\ 4 & 4 & 0 & 1 \\ 4 & 2 & -1 & 2 \end{pmatrix}$

b) $\begin{pmatrix} 5 & 30 & -13 & 3 \\ -2 & 3 & 0 & 2 \\ -7 & -1 & 8 & -1 \end{pmatrix}$

c) $\begin{pmatrix} 27 & -6 & -12 \\ -6 & 5 & 7 \\ -12 & 7 & 15 \end{pmatrix}$

d) $\begin{pmatrix} 14 & 9 & -9 & 2 \\ 9 & 18 & -14 & -3 \\ -9 & -14 & 13 & 1 \\ 2 & -3 & 1 & 2 \end{pmatrix}$

Problem 2. Let

a) $A = \begin{pmatrix} 1 & -3 \\ 2 & 0 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 3 \\ 1 & 1 \end{pmatrix}$ b) $A = \begin{pmatrix} 1 & -3 \\ 2 & 0 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 3 & 0 \\ 1 & 1 & -2 \end{pmatrix}$.

Calculate product of matrices $A.B$ and $B.A$, if it exists.

Results:

a) $A.B = \begin{pmatrix} -1 & 0 \\ 4 & 6 \end{pmatrix}$, $B.A = \begin{pmatrix} 8 & -6 \\ 3 & -3 \end{pmatrix}$ b) $A.B = \begin{pmatrix} -1 & 0 & 6 \\ 4 & 6 & 0 \end{pmatrix}$, $B.A$ is not defined.

Problem 3. Let $A = \begin{pmatrix} 1 & 0 & 1 \\ 2 & 3 & 1 \\ -2 & 2 & 2 \end{pmatrix}$, $B = \begin{pmatrix} 0 & -1 & 1 \\ 1 & 1 & 2 \\ -1 & 2 & 2 \end{pmatrix}$. Calculate $A.B$ and $B.A$.

Does the following equation hold? $A.B = B.A$

Results:

$A.B = \begin{pmatrix} -1 & 1 & 3 \\ 2 & 3 & 10 \\ 0 & 8 & 6 \end{pmatrix}$, $B.A = \begin{pmatrix} -4 & -1 & 1 \\ -1 & 7 & 6 \\ -1 & 10 & 5 \end{pmatrix}$, $A.B \neq B.A$