Matrix Multiplication

Multiplying Matrices

- We can only multiply matrices if the number of columns in the first matrix is the same as the number of rows in the second matrix.

- Then the resulting matrix will have the same number of rows as the first matrix and the same as the number of columns in the second matrix.

Example:

A (2×3) matrix can be multiplied by a (3×2) matrix (since the number of columns in the first matrix (3) is the same as the number of rows (3) in the second matrix). The result will be a (2×2) matrix (the number of rows in the first matrix by the number of columns in the second).

$$\begin{pmatrix} - & - & - \\ - & - & - \end{pmatrix} \begin{pmatrix} - & - \\ - & - \\ - & - \end{pmatrix} = \begin{pmatrix} - & - \\ - & - \end{pmatrix}.$$

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}$$

$$= \begin{pmatrix} 1 \times 1 + 2 \times 3 + 3 \times 5 & 1 \times 2 + 2 \times 4 + 3 \times 6 \\ 4 \times 1 + 5 \times 3 + 6 \times 5 & 4 \times 2 + 5 \times 4 + 6 \times 6 \end{pmatrix} = \begin{pmatrix} 1 + 6 + 15 & 2 + 8 + 18 \\ 4 + 15 + 30 & 8 + 20 + 36 \end{pmatrix} = \begin{pmatrix} 22 & 28 \\ 49 & 64 \end{pmatrix}$$