6- Preview Matrices

A **matrix** is an array of values in a Rectangular arrangement organized by rows and columns.

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1c} \\ a_{21} & a_{22} & \cdots & a_{2c} \\ \vdots & \vdots & & \vdots \\ a_{r1} & a_{r2} & & a_{rc} \end{bmatrix}$$

a_{rc} → element in A

a → element
r → row
c → column

Size of a Matrix

Rows × Columns

3×4 3 rows × 4 columns
M×N M rows × N columns

Equal Matrices

$A = B$ iff $a_{rc} = b_{rc}$

Matrices are equal if each ~~coordinate~~ element is equal

Scalar Multiplication

k is a scalar (multiply bafo)

kA → multiply every element by k.

$$A = \begin{bmatrix} 0 & 1 \\ 2 & 3 \end{bmatrix} \quad kA = \begin{bmatrix} 0k & 1k \\ 2k & 3k \end{bmatrix}$$

Matrix Addition

SAME SIZE Both need to be M×N.

add element-by-element

A+B

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

Properties

commutative $A+B = B+A$ add any order

associative prop $(A+B)+C = A+(B+C)$ group

multiply by a scalar $k(A+B) = kA+kB$

$(A+B)k = kA+kB$

Multiplication → $AB \neq BA$ order matters!!!

Subtraction → adding a negative

$A-B = A+(-1)B$

Division → multiplying by a fraction

$\frac{A}{4} = \frac{1}{4}A$