

Matrix Addition

Prerequisites, Formulas, and Common JEE Traps

$$[] + [] = []$$

The Golden Prerequisite

Before you can add corresponding elements, you must check the **order** ($m \times n$) of both matrices. ⚠️

LOGIC BLOCK: Matrix Addition Condition

If A is $m \times n$ and B is $p \times q$,
 $A + B$ exists $\Leftrightarrow m = p$ and $n = q$



2×3



OPERATION PERMITTED:
Dimensions Match



2×3

The Mathematical Definition

$$\mathbf{A} + \mathbf{B} = [a_{ij} + b_{ij}]$$

Exploded Breakdown Panel

- a_{ij} = Element in matrix **A** at row i , column j
- b_{ij} = Element in matrix **B** at row i , column j

Result: A new matrix **C** where every element $c_{ij} = a_{ij} + b_{ij}$



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$$E=mc^2$$



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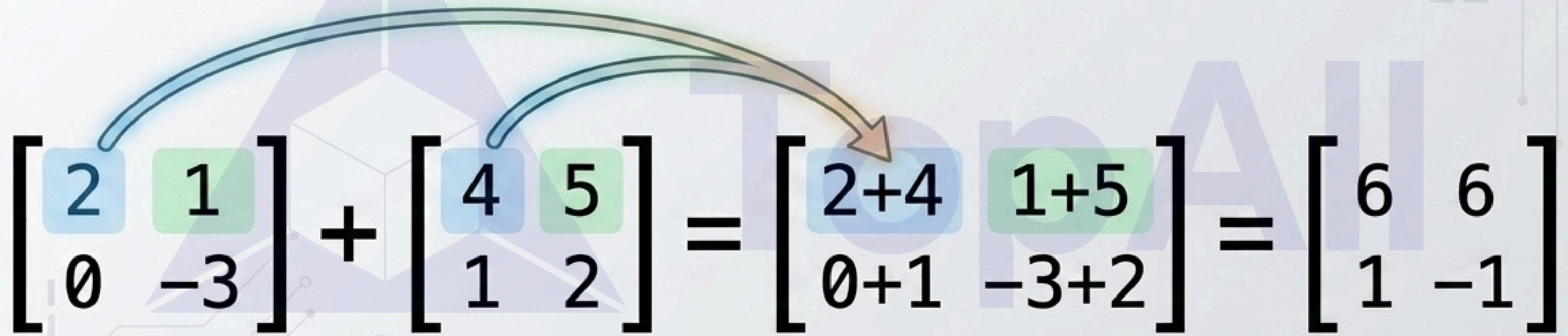
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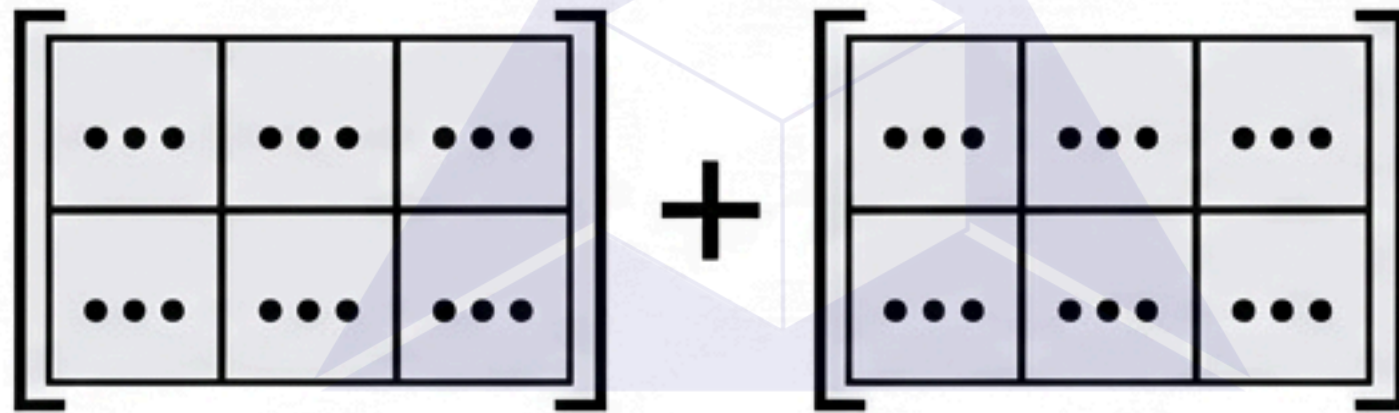
Adding Corresponding Cells

Add elements that share the exact same address.


$$\begin{bmatrix} 2 & 1 \\ 0 & -3 \end{bmatrix} + \begin{bmatrix} 4 & 5 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 2+4 & 1+5 \\ 0+1 & -3+2 \end{bmatrix} = \begin{bmatrix} 6 & 6 \\ 1 & -1 \end{bmatrix}$$

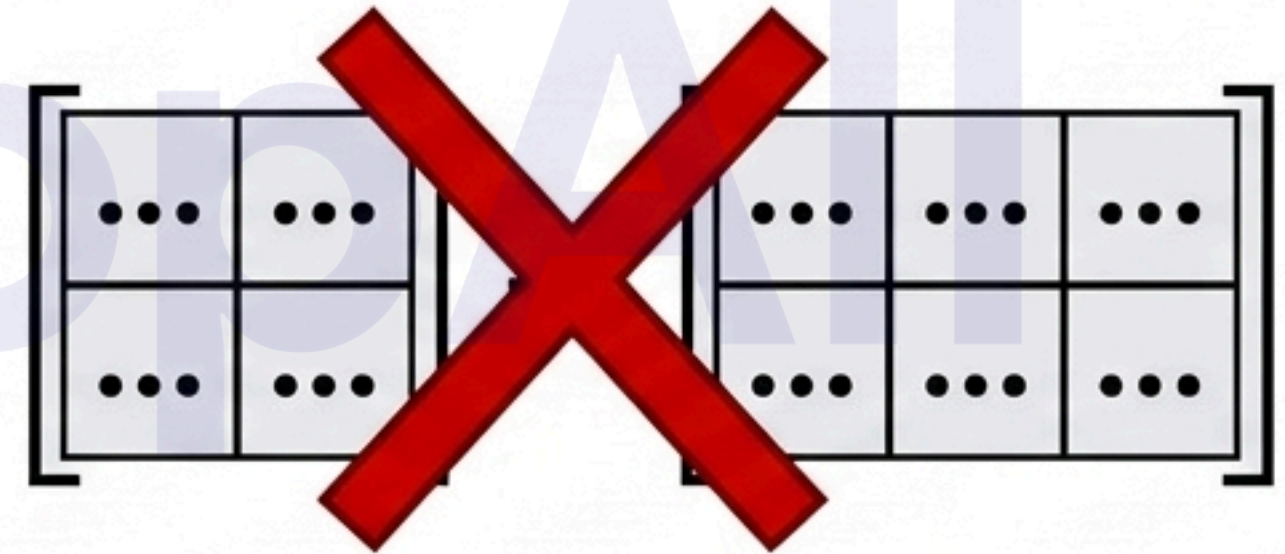
Validity Test

$$2 \times 3 + 2 \times 3 \quad \checkmark$$



Order matches. Addition is defined. Result is 2×3 .

$$2 \times 2 + 2 \times 3 \quad \times$$



Order mismatch. Dimensions do not align. Addition is strictly **undefined**.

JEE Trap ⚠

Same number of elements is not enough. Order must match.

$$[a \quad b \quad c \quad d]$$

4 Elements



$$\begin{bmatrix} w & x \\ y & z \end{bmatrix}$$

4 Elements

Examiners will try to trick you with matrices of orders 1×4 and 2×2 . Both contain 4 elements ($mn = 4$), but their geometries are incompatible. You cannot add them.

$$[a \quad b \quad c \quad d] + \begin{bmatrix} w & x \\ y & z \end{bmatrix} = \text{UNDEFINED}$$

Summary



Same order required. Addition is strictly defined only for matrices of the exact same dimensions ($m \times n$).



Add matching positions. Corresponding elements (same row i , same column j) are added together: $a_{ij} + b_{ij}$.



Result keeps same order. The resulting sum matrix will inherit the exact same order ($m \times n$) as the original matrices.



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