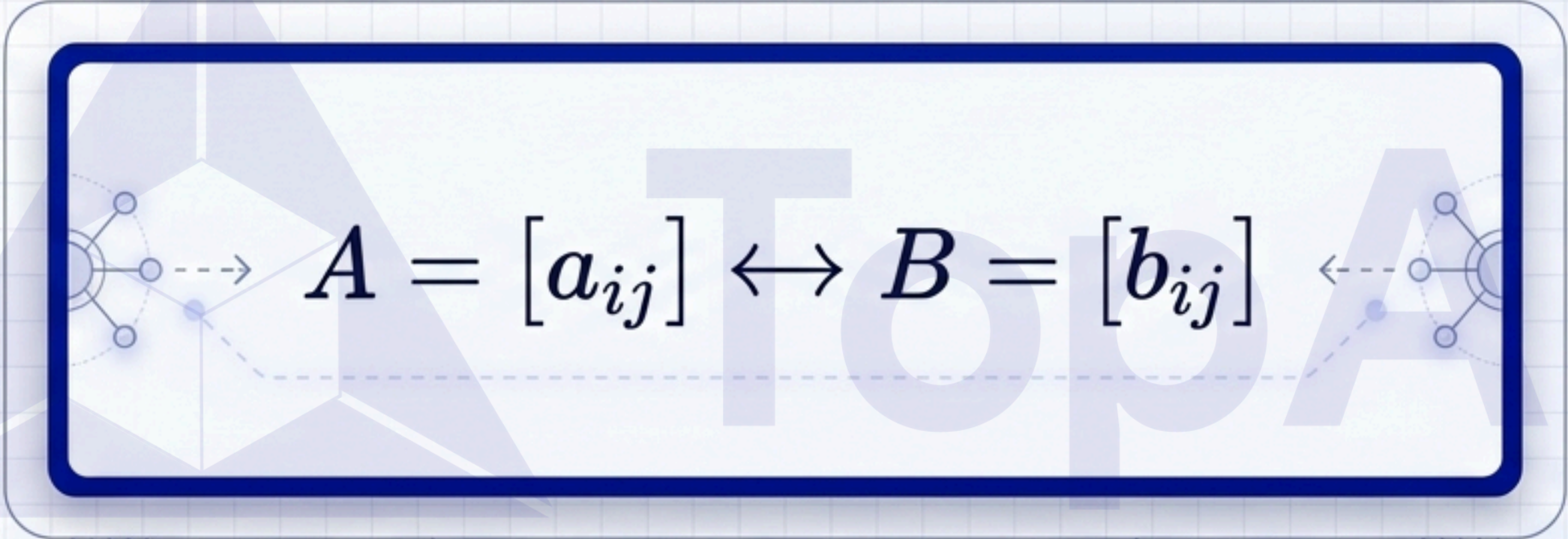


When Are Two Matrices Equal?


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

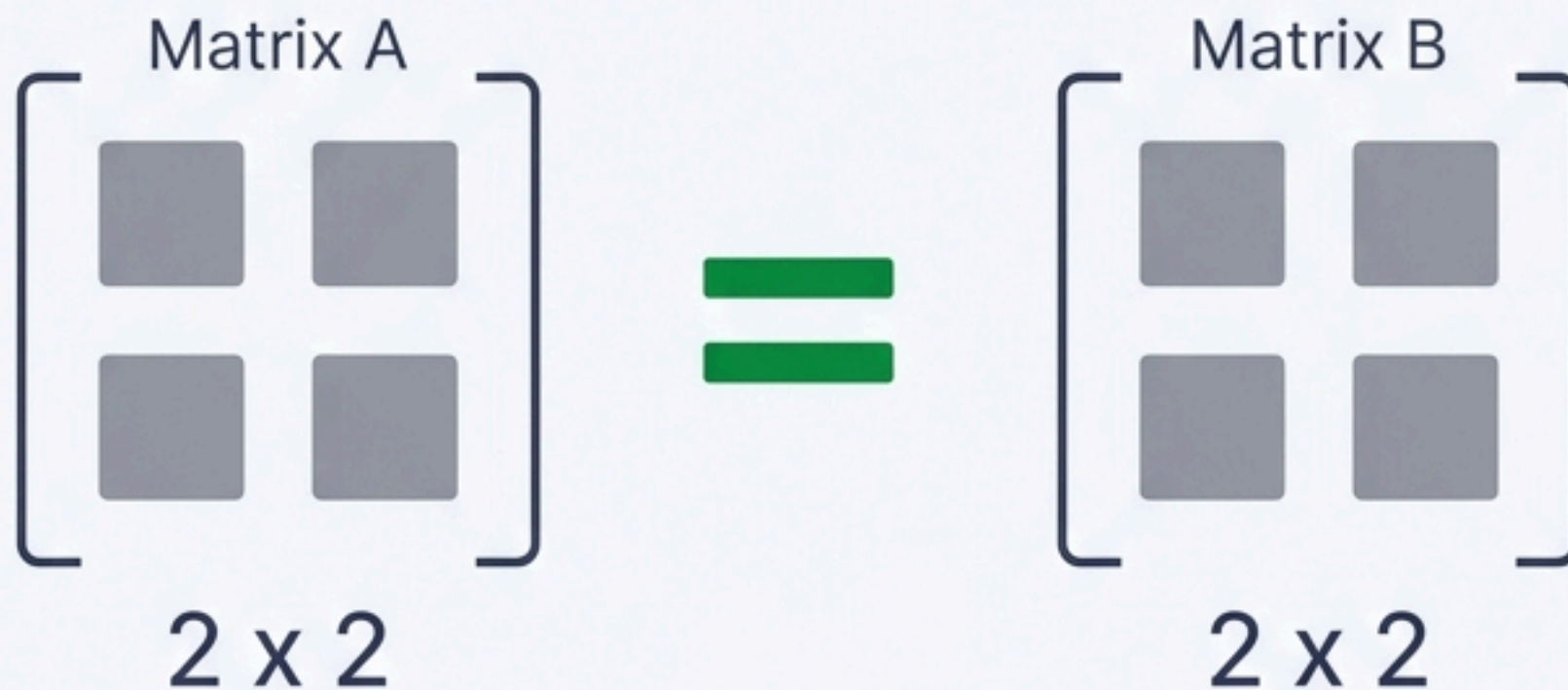
Lock 1: Strict Order Matching

$$m_1 \times n_1 == m_2 \times n_2$$

FAIL: Dimensions Mismatch



PASS



Matrices cannot be equal if their dimensions differ.
Always check the order before checking the elements.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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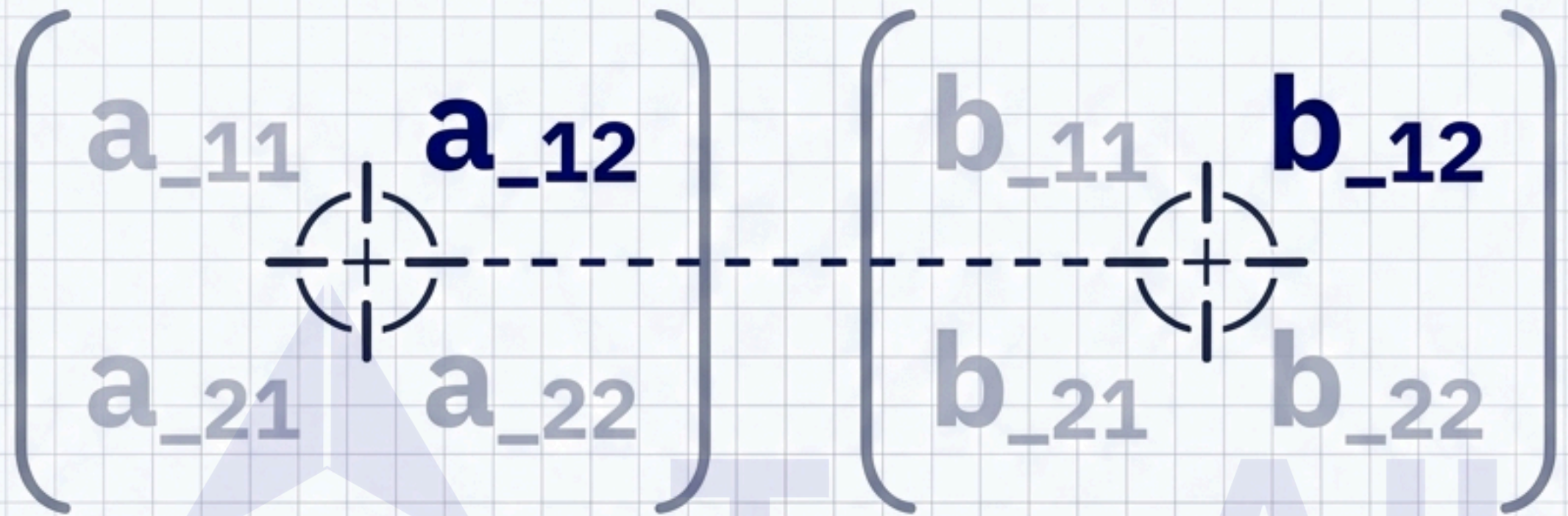
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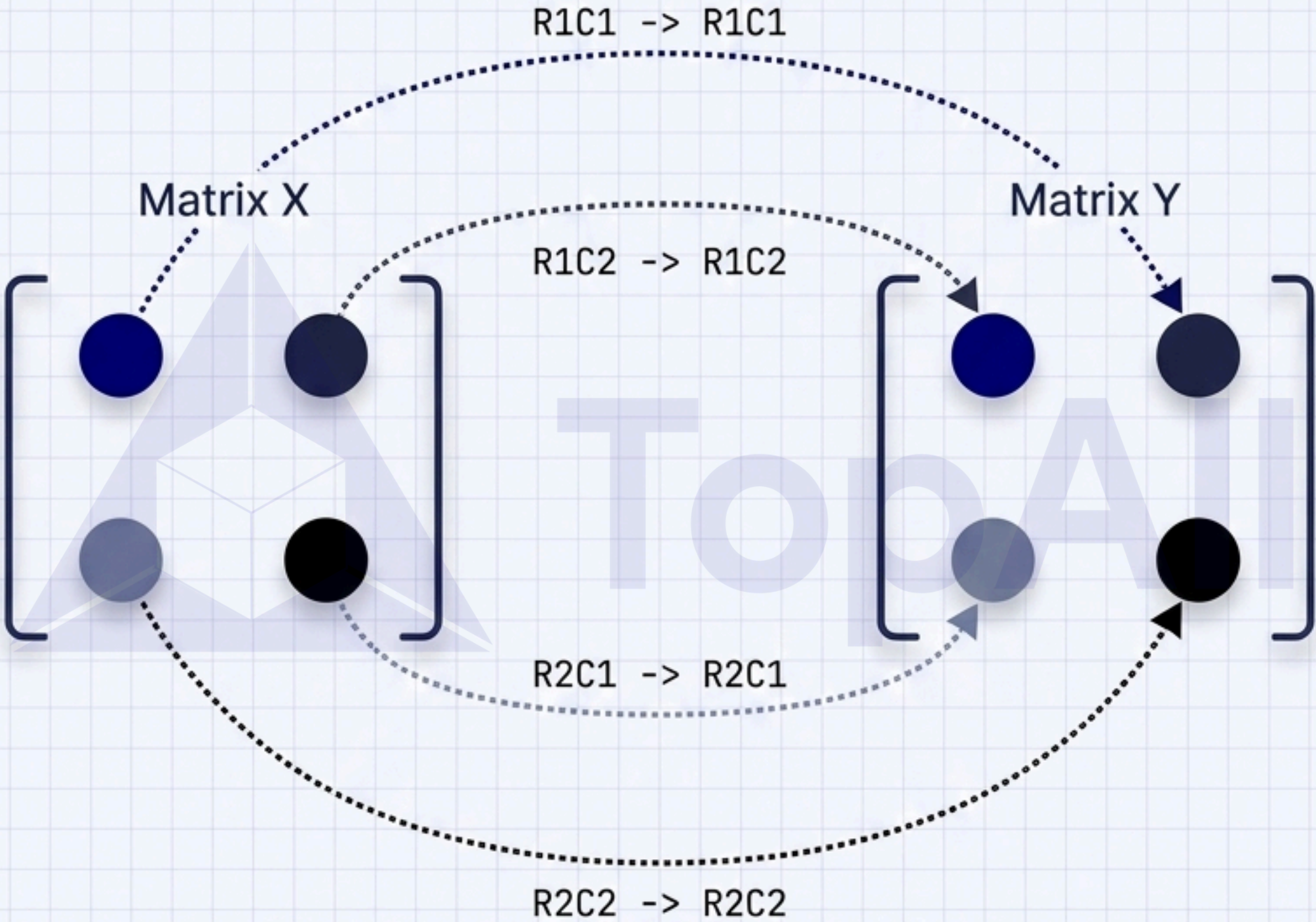
Lock 2: Corresponding Entries Equal


$$\begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} \quad \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix}$$

$$a_{ij} = b_{ij}$$

For matrices of the same order, every single element in Matrix A must identically match the element in the exact same position in Matrix B for all i and j .

Spatial Mapping: Position to Position



The JEE Trap: Scrambled Coordinates

Matrix A

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

$\neq$

Matrix B

$$\begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$$



Same values in different positions do not make matrices equal. Equality is strictly positional, not quantitative.

The Matrix Equality Algorithm

Step 1: Check Order

$$\begin{array}{|c|c|c|} \hline & & \\ \hline & & \\ \hline & & \\ \hline \end{array} = \begin{array}{|c|c|c|} \hline & & \\ \hline & & \\ \hline & & \\ \hline \end{array}$$

$m \times n$ $m \times n$



Step 2: Match Positions


 $a_{ij} \cdots \cdots \rightarrow b_{ij}$



Step 3: Extract Scalar Equations

 $[...] a = b [...]$ 

Scalar Equality

Application Example

$$[x+3] = [0]$$



$$x + 3 = 0 \rightarrow x = -3$$



You've Learned the Theory.

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