

NUMPY-4

$A \times B$

matrix multiplication

$$\begin{array}{cc}
 A & B \\
 \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} & \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix}
 \end{array}
 =
 \begin{array}{c}
 \begin{bmatrix} 1 \times 5 + 2 \times 7 & 1 \times 6 + 2 \times 8 \\ 3 \times 5 + 4 \times 7 & 3 \times 6 + 4 \times 8 \end{bmatrix} \\
 2 \times 2
 \end{array}$$

(2×2) (2×2)

cols. of A = Rows of B

(x, y) (a, b)

$\rightarrow y = a \rightarrow \text{true}$

resultant $\rightarrow (x, b)$
 (rows of a, cols of b)

$$= \begin{bmatrix} 19 & 22 \\ 43 & 50 \end{bmatrix}$$

$$\boxed{A * B} \\
 \begin{bmatrix} 5 & 12 \\ 21 & 32 \end{bmatrix}$$

A
 $(3, 4)$

B
 $(4, 3)$

=

$A \times B$
 $(3, 3)$

B
 $(4, 3)$

A
 $(3, 4)$

=

$B \times A$
 $(4, 4)$

generally $\underline{A \times B} \neq \underline{B \times A}$

$$\begin{matrix} A \\ (3, 4) \end{matrix}$$

$$\begin{matrix} B \\ (4, 1) \end{matrix}$$

$$\begin{matrix} A \times B \\ (3, 1) \end{matrix}$$

$$\begin{matrix} B \\ (4, 1) \end{matrix}$$

$$\begin{matrix} A \\ (3, 4) \end{matrix}$$

$B \times A$
error / not possible

$$\boxed{A \times B} \checkmark$$

$$\boxed{B \times A} \times$$