Some matrix operations

- Addition (+)

- Subtraction (-)

- Multiplication (x)

- Inversion (/)

Matrix ➔ combined vectors ➔ set of numbers

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Addition

- $A + A = B$

$$\begin{pmatrix} 1 & 2 \\ 4 & 5 \end{pmatrix} + \begin{pmatrix} 1 & 2 \\ 4 & 5 \end{pmatrix} = \begin{pmatrix} 2 & 4 \\ 8 & 10 \end{pmatrix}$$

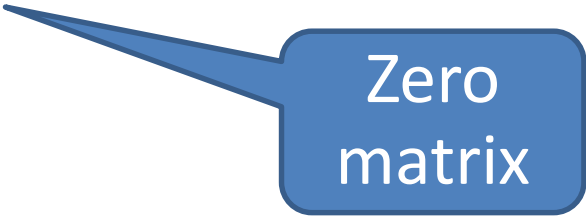$$[2{\times}2] \quad + \quad [2{\times}2] \quad = \quad [2{\times}2]$$

- $2.A = B$

$$2.\begin{pmatrix} 1 & 2 \\ 4 & 5 \end{pmatrix} = \begin{pmatrix} 2 & 4 \\ 8 & 10 \end{pmatrix}$$

Subtraction

- **A - A = B**

$$\begin{pmatrix} 1 & 2 \\ 4 & 5 \end{pmatrix} - \begin{pmatrix} 1 & 2 \\ 4 & 5 \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$$

Zero matrix

$$[2{\times}2] \quad - \quad [2{\times}2] \quad = \quad [2{\times}2]$$

- **$0.A$ = B**

$$0.\begin{pmatrix} 1 & 2 \\ 4 & 5 \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$$

Multiplication

- **A** × **B** = **C**

$$\begin{pmatrix} 1 & 2 \\ 4 & 5 \end{pmatrix} \times \begin{pmatrix} 2 & 3 & 4 \\ 5 & 6 & 7 \end{pmatrix} = \begin{pmatrix} 2 & 3 & 4 \\ 5 & 6 & 7 \end{pmatrix}$$

[2×2] × [2×3] = [2×3]

- **I** × **B** = **B**

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \times \begin{pmatrix} 1 & 2 \\ 4 & 5 \end{pmatrix} = \begin{pmatrix} 1 & 2 \\ 4 & 5 \end{pmatrix}$$

Identity matrix

[2×2] × [2×2] = [2×2]

Inversion

- $A \times A^{-1} = I$

$$\begin{pmatrix} 1 & 2 \\ 4 & 5 \end{pmatrix} \times \begin{pmatrix} -1.7 & 0.7 \\ 1.3 & -0.3 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

[2×2]   ×   [2×2]   =   [2×2]