

Matrices

- Adding ~~Subtracting~~
- Multiplying
- Row-echelon form (ref)
- Reduced ref (rref)
- Inverse and ref

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$$\begin{matrix} \text{m rows} \\ \text{n columns} \\ A \end{matrix}$$

$$\begin{matrix} \text{k columns} \\ \text{n rows} \\ B \end{matrix}$$

$$= \begin{matrix} C \\ (i,j) \\ m \times k \end{matrix}$$

$$C_{ij} = \text{i row.} \\ \cdot \text{j column}$$

To multiple matrices B should have n rows

$$\begin{matrix} A & B \\ 2 \times 3 & 3 \times 2 \\ 2 \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} & 3 \begin{bmatrix} 1 & 2 \\ 2 & 4 \\ 3 & 6 \end{bmatrix} \end{matrix} = \begin{matrix} C_{1,1} & C_{1,2} \\ 2 \times 2 \\ \begin{bmatrix} 22 & 28 \\ 44 & 64 \end{bmatrix} \\ C_{2,1} & C_{2,2} \end{matrix}$$

$$\left[\begin{array}{l} 1 \cdot 1 + 2 \cdot 3 + 3 \cdot 5 = 22 \\ 4 \cdot 1 + 5 \cdot 3 + 6 \cdot 5 = 49 \end{array} \quad \begin{array}{l} 1 \cdot 2 + 2 \cdot 4 + 3 \cdot 6 = 28 \\ 4 \cdot 2 + 5 \cdot 4 + 6 \cdot 6 = 64 \end{array} \right]$$

Row-echelon form

$$3 \begin{bmatrix} 1 & a & b & c \\ 0 & 1 & d & e \\ 0 & 0 & 1 & f \end{bmatrix} \text{ref}$$

Reduced ref is when you have ref and other only 0.

$$\begin{bmatrix} x & y & z & w \\ 0 & x & y & z \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

$$\left[\begin{array}{c|ccc} & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \end{array} \begin{array}{c} A_n \\ I_n \end{array} \right]$$

↓

$$\left[\begin{array}{c|ccc} & & & & \\ & & & & \\ & & & & \\ & & & & \\ & & & & \end{array} \begin{array}{c} I_n \\ B_n \end{array} \right]$$

$$A_n B_n = I_n$$

$$B_n = A_n^{-1}$$

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