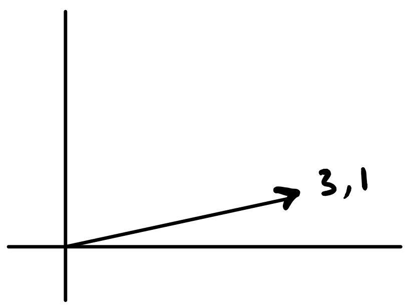
Vectors

length of vector $\|v\| = \sqrt{v_0^2 + v_0^2 \dots v_{n-1}^2}$

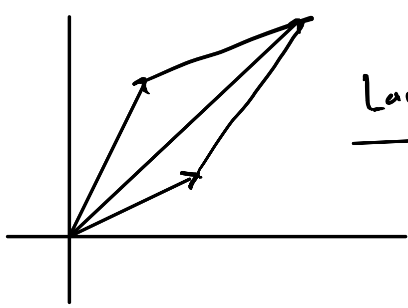
euclidean norm.

$v = \begin{bmatrix} 3 \\ 1 \end{bmatrix}$ $\sqrt{3^2 + 1^2} = \sqrt{10}$



Addition

$$v + u = \begin{bmatrix} 1 \\ 1 \end{bmatrix} + \begin{bmatrix} 1 \\ 2 \end{bmatrix} = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$$



Law of parrallelogram

Scalar product

$$kv = \begin{bmatrix} kv_0 \\ kv_1 \\ \vdots \\ kv_{n-1} \end{bmatrix}$$

eg $\begin{bmatrix} 2 \\ 3 \end{bmatrix}$, $k = 2$

$\begin{bmatrix} 4 \\ 6 \end{bmatrix}$

$A = a_{ij}$ i = row j = column

eg

$$A = \begin{array}{c c} & \begin{array}{ccc} 0 & 1 & 2 \end{array} \\ \begin{array}{c} 0 \\ 1 \\ 2 \end{array} & \begin{bmatrix} 2 & -9 & -1 \\ 4 & 2 & -3 \\ 7 & 0 & -4 \end{bmatrix} \end{array}$$

$a_{12} = -3$

$a_{22} = -4$

row   column

$$V = \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

Matrix addition

Add each corresponding dimension. Same $m \times n$.

Translation

When you add matrices, you are translating.

Multiplization

$M \times 1$ $1 \times n$

# of columns of A   Same   # of rows of B

dot product.

row 0 x column 0

row 1 x column 1

$a_{10} b_{01} + a_{11} b_{11} + a_{12} b_{21} \ldots$

$$\begin{matrix} 4 & 3 \\ 2 & 1 \end{matrix} \qquad \begin{matrix} 2 & -1 \\ -1 & 2 \end{matrix}$$

$8 - 3$

Transformations

- Identity matrix

$$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \leftarrow 2 \times 2$$

$n \times n$ = square matrix

eg
$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

$$A \times B \neq B \times A$$

Determinant

For a 2×2 matrix $A = \begin{matrix} a & b \\ c & d \end{matrix}$

$\det(A) = |A| = ad - bc$