Linear Algebra

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1 What are Vectors

Vectors are data types that contain a magnitude and direction

1.1 Notation

Vectors can be notated several ways.

$$\vec{v} = (3,4) = \begin{bmatrix} 3 \\ 4 \end{bmatrix} = 3\hat{i} + 4\hat{j} \in \mathbb{R}^2$$

$$\vec{w} = (3,4,5) = \begin{bmatrix} 3 \\ 4 \\ 5 \end{bmatrix} = 3\hat{i} + 4\hat{j} + 5\hat{k} \in \mathbb{R}^3$$

$\vec{v}$ is a member of "2" space, a tuple, 2-Dimensional. It has two components.
$\vec{w}$ is a member of "3" space, a triple, 3-Dimensional. It has three components.

1.2 Operations

Adding Vectors

$$\vec{a} = \begin{bmatrix} 6 \\ -2 \end{bmatrix} \vec{b} = \begin{bmatrix} -4 \\ 4 \end{bmatrix}$$

$\vec{a}, \vec{b} \in \mathbb{R}^2$
Vectors a, and b are members of $\mathbb{R}^2$
$$\vec{a} + \vec{b} = \begin{bmatrix} 6 + (-4) \\ -2 + 4 \end{bmatrix} = \begin{bmatrix} 2 \\ 2 \end{bmatrix}$$