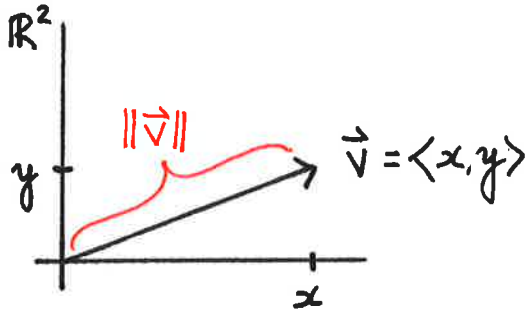
§2

$\langle 2,6\rangle \in \mathbb{R}^2$ and $\langle 1,-3,7\rangle \in \mathbb{R}^3$ are vectors.



$\|\vec{v}\| = \sqrt{x^2+y^2}$ is the <u>magnitude</u> of $\vec{v}$, the length of $\vec{v}$.

If $\vec{w} = \langle x,y,z\rangle$, then $\|\vec{w}\| = \sqrt{x^2+y^2+z^2}$

$\vec{v}$ is a <u>unit vector</u> if $\|\vec{v}\| = 1$

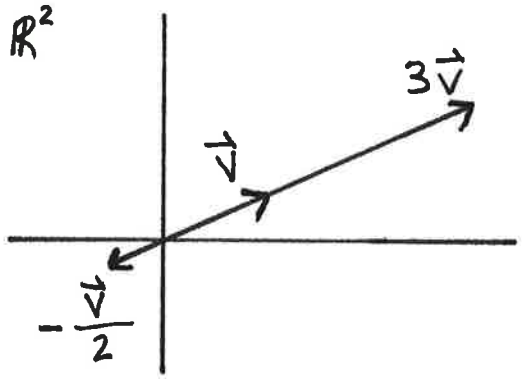
Important vectors:

In $\mathbb{R}^2$: $\vec{0} = \langle 0,0\rangle$, $\vec{i} = \langle 1,0\rangle$, $\vec{j} = \langle 0,1\rangle$.

In $\mathbb{R}^3$: $\vec{0} = \langle 0,0,0\rangle$, $\vec{i} = \langle 1,0,0\rangle$,
$\vec{j} = \langle 0,1,0\rangle$, $\vec{k} = \langle 0,0,1\rangle$.

To add vectors, add their coordinates.

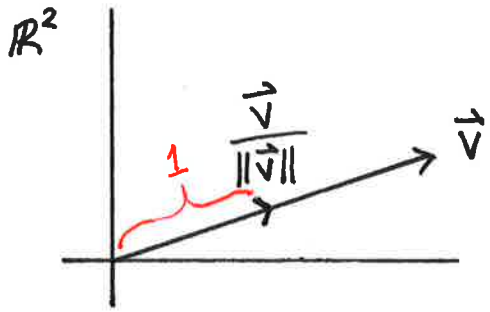
To scale a vector by $a \in \mathbb{R}$, multiply each coordinate by a.

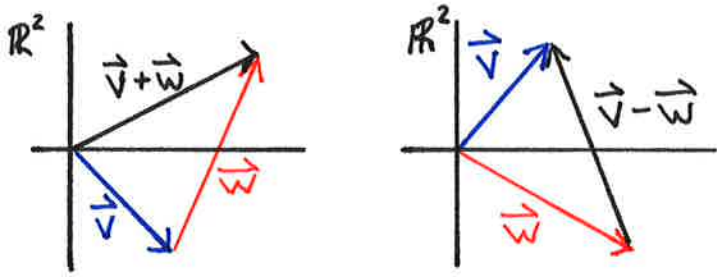


$3\vec{v}$ is in the same direction as $\vec{v}$ and has 3 times the magnitude.

$-\frac{\vec{v}}{2}$ is in the opposite direction of $\vec{v}$ and has ½ the magnitude.

If $\vec{v} \in \mathbb{R}^n$ (and $\vec{v} \neq \vec{0}$) then $\frac{\vec{v}}{\|\vec{v}\|}$ is the unit vector in direction of $\vec{v}$.





$\|\vec{v}-\vec{w}\|$ is the distance between $\vec{v}$ and $\vec{w}$

In $\mathbb{R}^2$, $a\vec{i}+b\vec{j} = \langle a, b \rangle$

In $\mathbb{R}^3$, $a\vec{i}+b\vec{j}+c\vec{k} = \langle a, b, c \rangle$