

1. Find the magnitude of the vector $\mathbf{v} = 3\mathbf{i} - 2\mathbf{j} + \mathbf{k}$

$$\vec{v} = \langle 3, -2, 1 \rangle$$

$$\begin{aligned} \text{magnitude} = |\vec{v}| &= \sqrt{(3)^2 + (-2)^2 + (1)^2} \\ &= \sqrt{9 + 4 + 1} \\ &= \sqrt{14} \end{aligned}$$

Excellent!

\therefore The magnitude of vector v is $\sqrt{14}$

2. Find a unit vector with the same direction as $\mathbf{w} = \langle 2, -2, 1 \rangle$

$$\vec{w} = \langle 2, -2, 1 \rangle$$

$$|\vec{w}| = \sqrt{(2)^2 + (-2)^2 + (1)^2}$$

$$|\vec{w}| = \sqrt{4 + 4 + 1}$$

$$|\vec{w}| = \sqrt{9} = 3$$

Excellent!

Let \vec{u} be our unit vector of \vec{w} in the same direction

$$\vec{u} = \frac{\vec{w}}{|\vec{w}|} = \left\langle \frac{2}{3}, \frac{-2}{3}, \frac{1}{3} \right\rangle$$

$$\vec{u} = \left\langle \frac{2}{3}, \frac{-2}{3}, \frac{1}{3} \right\rangle$$