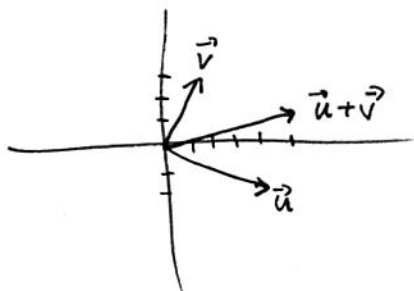


Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Use $\vec{u} = \langle 4, -2 \rangle$, $\vec{v} = \langle 1, 3 \rangle$ to find the following.
- a. Find $\vec{u} + \vec{v}$, then graph $\vec{u}$, $\vec{v}$ and $\vec{u} + \vec{v}$ on the same graph.

$$\langle 5, 1 \rangle$$



- b. $\|\vec{u}\|$

$$\sqrt{4^2 + (-2)^2} = \sqrt{16+4} = \sqrt{20} = 2\sqrt{5}$$

- c. Write a unit vector in the direction of $\vec{u}$.

$$\left\langle \frac{4}{2\sqrt{5}}, \frac{-2}{2\sqrt{5}} \right\rangle = \left\langle \frac{2}{\sqrt{5}}, \frac{-1}{\sqrt{5}} \right\rangle$$

2. Use $\vec{u} = \langle 2, -1, 3 \rangle$, $\vec{v} = \langle -1, 4, 0 \rangle$ to find $2\vec{u} - \vec{v}$.

$$2\langle 2, -1, 3 \rangle - \langle -1, 4, 0 \rangle = \langle 4, -2, 6 \rangle + \langle 1, -4, 0 \rangle = \langle 5, -6, 6 \rangle$$

3. Given the points $P(1, 2, 3)$, $Q(-1, 0, 4)$, $R(0, 1, 2)$, find the following:

- a. The vectors $\vec{PQ}$, $\vec{PR}$, $\vec{QR}$

$$\vec{PQ} = \langle 4-3, 0-2, -1-3 \rangle = \langle 1, -2, -2 \rangle$$

$$\vec{PR} = \langle 0-1, 1-2, 2-3 \rangle = \langle -1, -1, -1 \rangle$$

$$\vec{QR} = \langle 0-(-1), 1-0, 2-4 \rangle = \langle 1, 1, -2 \rangle$$

- b. Do these three points form a right triangle?

$$\|\vec{PQ}\| = \sqrt{1+4+4} = \sqrt{9} = 3$$

$$6+3=9 \checkmark$$

$$\|\vec{PR}\| = \sqrt{1+1+4} = \sqrt{6}$$

$$\|\vec{PQ}\| = \sqrt{1+1+1} = \sqrt{3}$$

it is a right triangle