Vectors Cont.

Monday, May 8, 2023 9:30 AM

ex)

problem: find v (the vector) in same direction $\vec{PQ}$, but of unit length ($|v| = 1$)

(application of operation 2)

solution: 1) we know $|\vec{PQ}| = \sqrt{17}$

2) $|c \cdot \vec{PQ}| = |c| \cdot \sqrt{17}$

want c such that $|c \cdot \vec{PQ}| = 1$, so $c = \frac{1}{\sqrt{17}}$ $\longrightarrow$ $|v| = \frac{1}{\sqrt{17}} \cdot \vec{PQ}$

problem: find midpoint between P & Q

$P = (-1, 2, 1)$

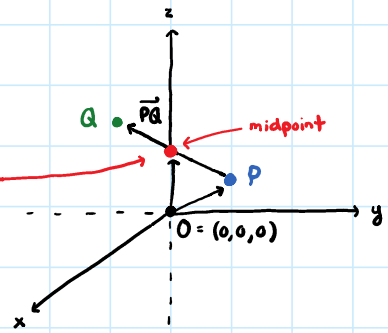
$Q = (2, 0, 3)$

$\frac{1}{2}PQ = \langle \frac{3}{2}, -1, 1 \rangle$

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

midpoint is end of: $\vec{OP} + \frac{1}{2}\vec{PQ} = \langle \frac{1}{2}, 1, 2 \rangle$

midpoint $= (\frac{1}{2}, 1, 2)$



formula for midpoint: $P = (x_1, y_1, z_1)$, $Q = (x_2, y_2, z_2)$, then midpoint ...

$$= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}, \frac{z_1 + z_2}{2} \right)$$

ex above) midpoint $= \left(\frac{-1 + 2}{2}, \frac{2 + 0}{2}, \frac{1 + 3}{2} \right)$

$= \left(\frac{1}{2}, 1, 2 \right)$