

Question

Given $\mathbf{a} = (2, 1, 0)$, $\mathbf{b} = (1, 2, 3)$, $\mathbf{c} = (0, 1, -2)$ find (a) $\mathbf{a} + \mathbf{b}$; (b) $\mathbf{b} - 2\mathbf{a}$; (c) $\hat{\mathbf{c}}$; (d) $|\mathbf{b}|$

Answer

$$\mathbf{a} = (2, 1, 0), \mathbf{b} = (1, 2, 3), \mathbf{c} = (0, 1, -2)$$

$$(a) \mathbf{a} + \mathbf{b} = (2 + 1, 1 + 2, 0 + 3) = (3, 3, 3)$$

$$(b) \mathbf{b} - 2\mathbf{a} = (1, 2, 3) + (-2)(2, 1, 0) = (1, 2, 3) - (4, 2, 0) = (-3, 0, 3)$$

$$(c) \hat{\mathbf{c}} = \frac{\mathbf{c}}{|\mathbf{c}|} = \frac{(0, 1, -2)}{\sqrt{0^2 + 1^2 + (-2)^2}} = \left(0, \frac{1}{\sqrt{5}}, \frac{-2}{\sqrt{5}}\right)$$

$$(d) |\mathbf{b}| = \sqrt{2^2 + 1^2 + 3^2} = \sqrt{14}$$