

3.2 Given vectors $\mathbf{A} = \hat{x}2 - \hat{y}3 + \hat{z}$, $\mathbf{B} = \hat{x}2 - \hat{y} + \hat{z}3$, and $\mathbf{C} = \hat{x}4 + \hat{y}2 - \hat{z}2$, show that \mathbf{C} is perpendicular to both \mathbf{A} and \mathbf{B} .

Solution:

$$\mathbf{A} \cdot \mathbf{C} = (\hat{x}2 - \hat{y}3 + \hat{z}) \cdot (\hat{x}4 + \hat{y}2 - \hat{z}2) = 8 - 6 - 2 = 0,$$

$$\mathbf{B} \cdot \mathbf{C} = (\hat{x}2 - \hat{y} + \hat{z}3) \cdot (\hat{x}4 + \hat{y}2 - \hat{z}2) = 8 - 2 - 6 = 0.$$
