

Exercise 11

In Exercises 6 to 11, compute $\|\mathbf{u}\|$, $\|\mathbf{v}\|$, and $\mathbf{u} \cdot \mathbf{v}$ for the given vectors in \mathbb{R}^3 .

$$\mathbf{u} = -\mathbf{i} + 2\mathbf{j} - 3\mathbf{k}, \quad \mathbf{v} = -\mathbf{i} - 3\mathbf{j} + 4\mathbf{k}$$

Solution

$$\|\mathbf{u}\| = \sqrt{(-1)^2 + 2^2 + (-3)^2} = \sqrt{14} \approx 3.74$$

$$\|\mathbf{v}\| = \sqrt{(-1)^2 + (-3)^2 + 4^2} = \sqrt{26} \approx 5.10$$

$$\mathbf{u} \cdot \mathbf{v} = (-\mathbf{i} + 2\mathbf{j} - 3\mathbf{k}) \cdot (-\mathbf{i} - 3\mathbf{j} + 4\mathbf{k}) = (-1)(-1) + (2)(-3) + (-3)(4) = -17$$