

Exercise 6

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

$$\mathbf{u} = 15\mathbf{i} - 2\mathbf{j} + 4\mathbf{k}, \mathbf{v} = \pi\mathbf{i} + 3\mathbf{j} - \mathbf{k}$$

Solution

$$\|\mathbf{u}\| = \sqrt{15^2 + (-2)^2 + 4^2} = \sqrt{245} \approx 15.7$$

$$\|\mathbf{v}\| = \sqrt{\pi^2 + 3^2 + (-1)^2} = \sqrt{\pi^2 + 10} \approx 4.46$$

$$\mathbf{u} \cdot \mathbf{v} = (15\mathbf{i} - 2\mathbf{j} + 4\mathbf{k}) \cdot (\pi\mathbf{i} + 3\mathbf{j} - \mathbf{k}) = (15)(\pi) + (-2)(3) + (4)(-1) = 15\pi - 10$$