Exercise 9

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

$$\mathbf{u} = -\mathbf{i} + 3\mathbf{j} + \mathbf{k},\ \mathbf{v} = -2\mathbf{i} - 3\mathbf{j} - 7\mathbf{k}$$

Solution

$$\|\mathbf{u}\| = \sqrt{(-1)^2 + 3^2 + 1^2} = \sqrt{11} \approx 3.32$$

$$\|\mathbf{v}\| = \sqrt{(-2)^2 + (-3)^2 + (-7)^2} = \sqrt{62} \approx 7.87$$

$$\mathbf{u} \cdot \mathbf{v} = (-\mathbf{i} + 3\mathbf{j} + \mathbf{k}) \cdot (-2\mathbf{i} - 3\mathbf{j} - 7\mathbf{k}) = (-1)(-2) + (3)(-3) + (1)(-7) = -14$$