

Exercise 5

Is $\|8\mathbf{i} - 12\mathbf{k}\| \cdot \|6\mathbf{j} + \mathbf{k}\| - |(8\mathbf{i} - 12\mathbf{k}) \cdot (6\mathbf{j} + \mathbf{k})|$ equal to zero? Explain.

Solution

$$\begin{aligned}\|8\mathbf{i} - 12\mathbf{k}\| \cdot \|6\mathbf{j} + \mathbf{k}\| - |(8\mathbf{i} - 12\mathbf{k}) \cdot (6\mathbf{j} + \mathbf{k})| &= \sqrt{8^2 + (-12)^2} \sqrt{6^2 + 1^2} - |(8)(0) + (0)(6) + (-12)(1)| \\ &= \sqrt{208} \sqrt{37} - |-12| \\ &= \sqrt{208} \sqrt{37} - 12 \\ &\approx 75.7\end{aligned}$$