Answer on Question #76444 – Math – Calculus

Question

Let $x = e_1 + e_2 - 2e_3$, $y = 2e_1 - e_2 + e_3$, where e_1, e_2, e_3 are unit vectors. Find $|x + y|$ and $|x + 2y|$.

Solution

First of all, if $z = ae_1 + be_2 + ce_3$, we know that $|z| = \sqrt{a^2 + b^2 + c^2}$. We can use this definition to solve our problems:

$$|x + y| = |3e_1 + 0e_2 - 1e_3| = \sqrt{3^2 + (-1)^2} = \sqrt{10};$$

$$|x + 2y| = |5e_1 - 1e_2 + 0e_3| = \sqrt{5^2 + (-1)^2} = \sqrt{26}.$$

Answer: $|x + y| = \sqrt{10}$, $|x + 2y| = \sqrt{26}$.