

$$\mathbf{a} + \mathbf{b} = (3\mathbf{i} - 5\mathbf{j} + 3\mathbf{k}) + (3\mathbf{j} - \mathbf{k}) = 3\mathbf{i} - 2\mathbf{j} + 2\mathbf{k}$$

$$\begin{aligned} 2\mathbf{a} + 4\mathbf{b} &= 2(3\mathbf{i} - 5\mathbf{j} + 3\mathbf{k}) + 4(3\mathbf{j} - \mathbf{k}) \\ &= 6\mathbf{i} - 10\mathbf{j} + 6\mathbf{k} + 12\mathbf{j} - 4\mathbf{k} \\ &= 6\mathbf{i} + 2\mathbf{j} + 2\mathbf{k} \end{aligned}$$

$$|\mathbf{a}| = \sqrt{3^2 + (-5)^2 + 3^2} = \sqrt{43}$$

$$\begin{aligned} |\mathbf{a} - \mathbf{b}| &= |(3\mathbf{i} - 5\mathbf{j} + 3\mathbf{k}) - (3\mathbf{j} - \mathbf{k})| = |3\mathbf{i} - 8\mathbf{j} + 4\mathbf{k}| \\ &= \sqrt{3^2 + (-8)^2 + 4^2} = \sqrt{89} \end{aligned}$$