1.11.15

AI25BTECH11013-Gautham

Question:
Write the direction ratios of the vector $3\mathbf{a} + 2\mathbf{b}$ where $\mathbf{a} = \vec{i} + \vec{j} - 2\vec{k}$ and $\mathbf{b} = 2\vec{i} - 4\vec{j} + 5\vec{k}$.
Solution:
The given vectors $\mathbf{a}$ and $\mathbf{b}$ are

$$\mathbf{a} = \begin{pmatrix} 1 \\ 1 \\ -2 \end{pmatrix} \tag{0.1}$$

$$\mathbf{b} = \begin{pmatrix} 2 \\ -4 \\ 5 \end{pmatrix} \tag{0.2}$$

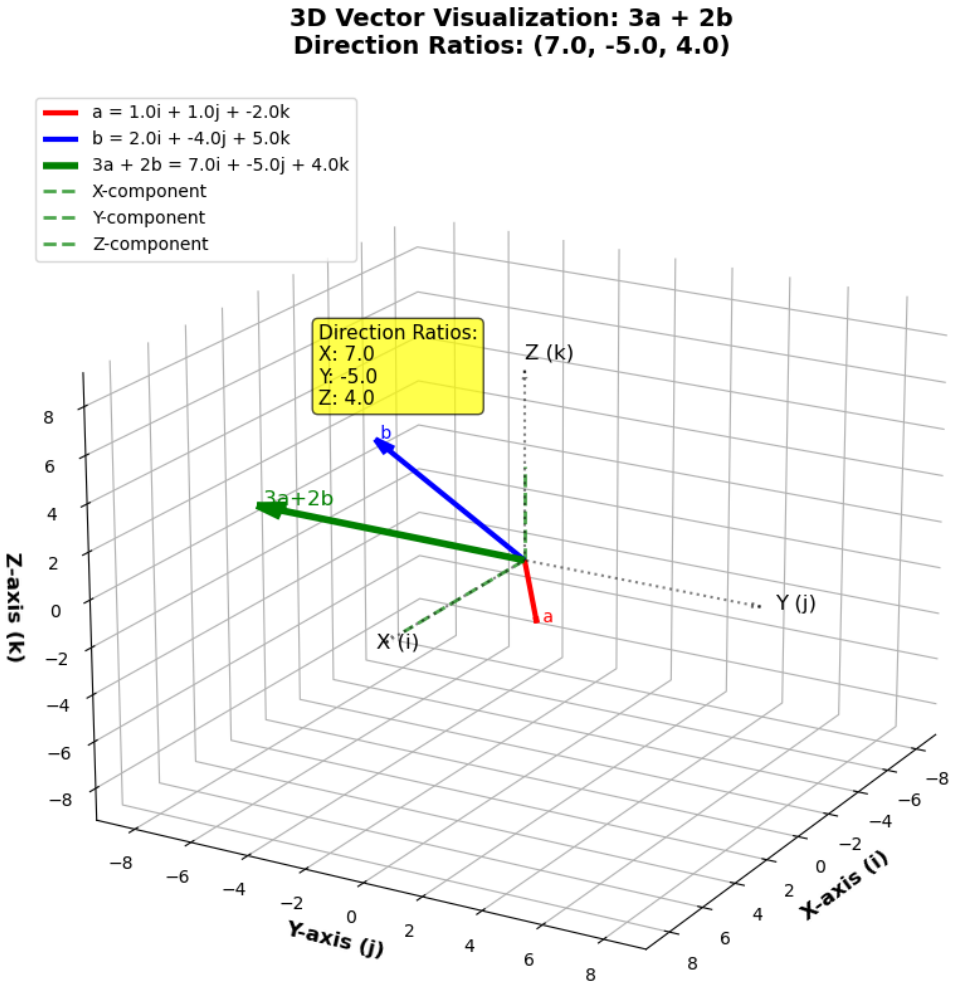
The direction ratios of the vector $3\mathbf{a} + 2\mathbf{b}$ are

$$3\mathbf{a} + 2\mathbf{b} = \begin{pmatrix} a & b \end{pmatrix} \begin{pmatrix} 3 \\ 2 \end{pmatrix} \tag{0.3}$$

$$3\mathbf{a} + 2\mathbf{b} = \begin{pmatrix} 1 & 2 \\ 1 & -4 \\ -2 & 5 \end{pmatrix} \begin{pmatrix} 3 \\ 2 \end{pmatrix} \tag{0.4}$$

$$3\mathbf{a} + 2\mathbf{b} = \begin{pmatrix} 3(1) + 2(2) \\ 3(1) + 2(-4) \\ 3(-2) + 2(5) \end{pmatrix} \tag{0.5}$$

$$3\mathbf{a} + 2\mathbf{b} = \begin{pmatrix} 7 \\ -5 \\ 4 \end{pmatrix} \tag{0.6}$$


3D Vector Visualization: 3a + 2b
Direction Ratios: (7.0, -5.0, 4.0)
a = 1.0i + 1.0j + -2.0k
b = 2.0i + -4.0j + 5.0k
3a + 2b = 7.0i + -5.0j + 4.0k
X-component
Y-component
Z-component
Direction Ratios:
X: 7.0
Y: -5.0
Z: 4.0
Z (k)
b
3a+2b
a
Y (j)
X (i)
Z-axis (k)
Y-axis (j)
X-axis (i)