1.10.29

EE25BTECH11061 - V.Sainadh

Question:
A vector $\mathbf{r}$ is inclined at equal angles to the three axes. If the magnitude of $\mathbf{r}$ is $2\sqrt{3}$ units, find $\mathbf{r}$.

Solution:
A vector equally inclined to all three coordinate axes has equal components. Let the common scale be c. Then,

$$\mathbf{r} = c\begin{pmatrix}1\\1\\1\end{pmatrix} \tag{1}$$

$$\|\mathbf{r}\| = |c|\sqrt{1^2+1^2+1^2} = |c|\sqrt{3}. \tag{2}$$

Given $\|\mathbf{r}\| = 2\sqrt{3}$,

$$2\sqrt{3} = |c|\sqrt{3} \tag{3}$$

$$\implies |c| = 2. \tag{4}$$

Hence,

$$\mathbf{r} = \begin{pmatrix}2\\2\\2\end{pmatrix} \quad \text{or} \quad \mathbf{r} = \begin{pmatrix}-2\\-2\\-2\end{pmatrix}. \tag{5}$$

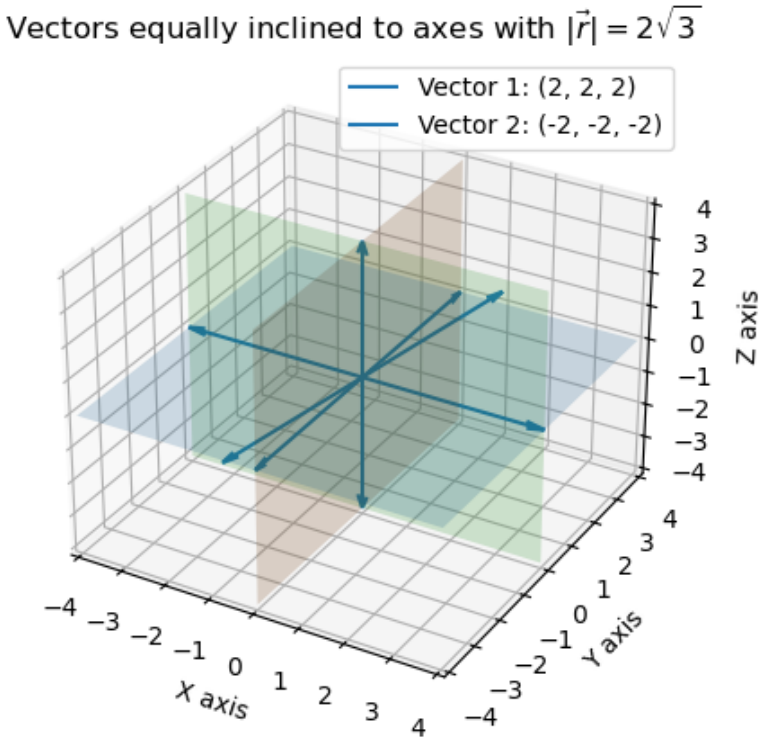

Fig. 0: Plot of the vector $\mathbf{r}$