1.1.10.22

EE24BTECH11024 - G.Abhimanyu Koushik

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

Solution:

Symbol	Description
$\mathbf{r}$	Given vector
c	Scaling factor

TABLE 0: Variables Used

A vector which subtends equal angles to all three axes will have equal components, and given the length of vector is $2\sqrt{3}$.

$$\mathbf{r} = c \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \tag{0.1}$$

$$\|\mathbf{r}\| = |c| \left\| \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \right\| \tag{0.2}$$

$$\|\mathbf{r}\| = |c| \sqrt{3} \tag{0.3}$$

$$2\sqrt{3} = |c| \sqrt{3} \tag{0.4}$$

$$|c| = 2 \tag{0.5}$$

$$\implies \mathbf{r} = \begin{pmatrix} 2 \\ 2 \\ 2 \end{pmatrix} \text{ or } \mathbf{r} = \begin{pmatrix} -2 \\ -2 \\ -2 \end{pmatrix} \tag{0.6}$$
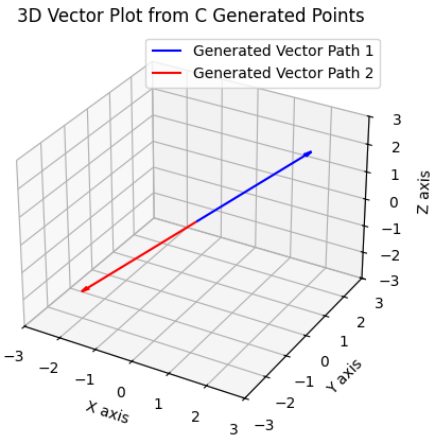
Fig. 0.1: Vectors inclining equally to all axes and of length $2\sqrt{3}$