1.11.1

EE25BTECH11064 - Yojit Manral

Question:
Find a vector **r** that is equally inclined to the three axes and whose magnitude is $3\sqrt{3}$ units.

Solution:
→ A vector that subtends equal angles to all three axes will have equal components. Let the scaling factor be c. Then,

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

$$\implies \|\mathbf{r}\| = |c| \left\| \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \right\| \tag{2}$$

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

$$\text{Given that, } \|\mathbf{r}\| = 3\sqrt{3} \tag{4}$$

$$\implies 3\sqrt{3} = |c| \sqrt{3} \tag{5}$$

$$\implies |c| = 3 \tag{6}$$

$$\implies \mathbf{r} = \begin{pmatrix} 3 \\ 3 \\ 3 \end{pmatrix} \text{ or } \mathbf{r} = \begin{pmatrix} -3 \\ -3 \\ -3 \end{pmatrix} \tag{7}$$

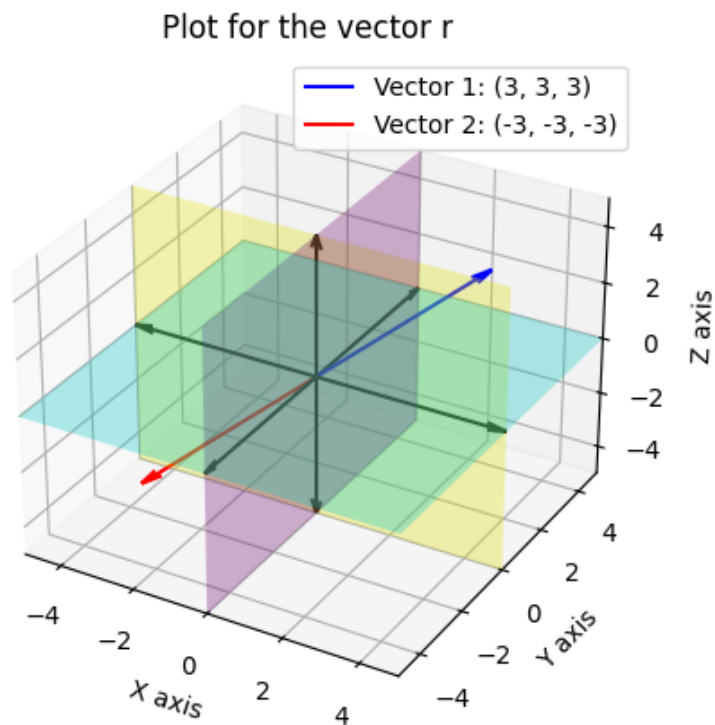Fig. 0: Plot of the vector **r**