1-1.11-4

EE24BTECH11005 - Arjun Pavanje

Question:

The vector of magnitude 9 units in the direction of the vector $\begin{pmatrix}-2\\-1\\2\end{pmatrix}$ is _____.

Variable	Description
A	$\begin{pmatrix}-2\\-1\\2\end{pmatrix}$ vector

TABLE I: Variables Used

Solution: Unit vector in the direction of **A** is

$$\frac{A}{\|A\|} \tag{1}$$

$$\|A\| = A^T A \tag{2}$$

$$= \begin{pmatrix}-2 & -1 & 2\end{pmatrix}\begin{pmatrix}-2\\-1\\2\end{pmatrix} \tag{3}$$

$$= \sqrt{9} = 3 \tag{4}$$

$\therefore$ the vector in the direction of **A**, with magnitude 9 is

$$9\frac{A}{\|A\|} = 9\frac{\begin{pmatrix}-2\\-1\\2\end{pmatrix}}{3} \tag{5}$$

$$= 3\begin{pmatrix}-2\\-1\\2\end{pmatrix} \tag{6}$$

So, $3\begin{pmatrix}-2\\-1\\2\end{pmatrix}$ or $\begin{pmatrix}-6\\-3\\6\end{pmatrix}$ is the required vector

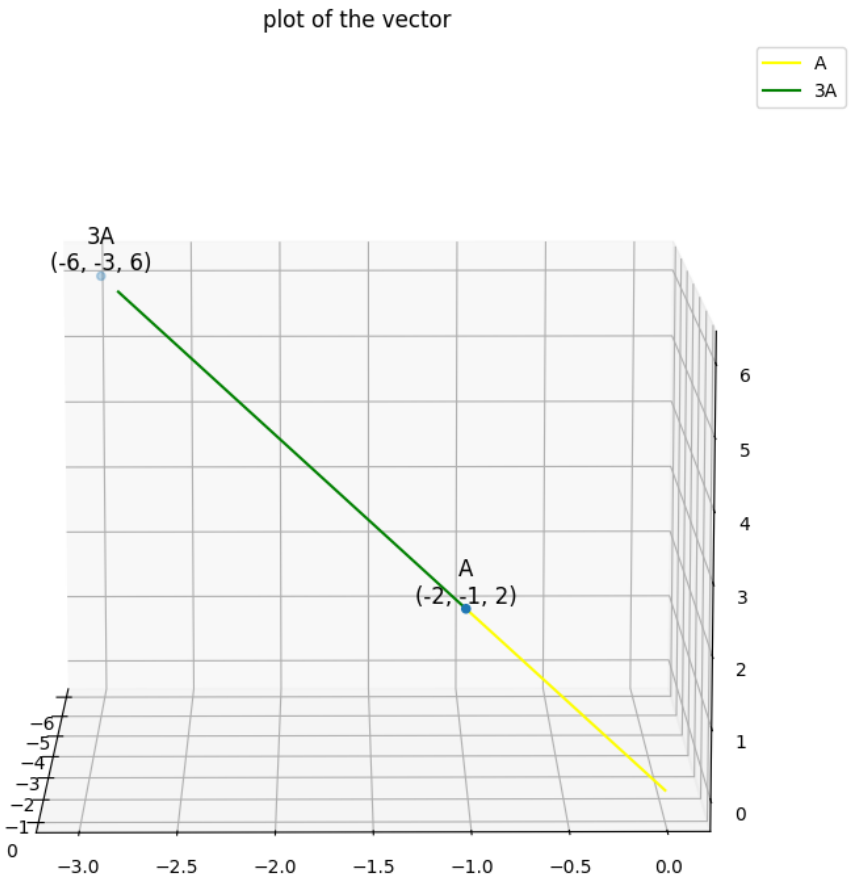

Fig. 1: Plot of the vectors