

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 _____.

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

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

TABLE I: Variables Used

$$\frac{A}{\|A\|} \quad (1)$$

$$\|A\| = A^T A \quad (2)$$

$$= \begin{pmatrix} -2 \\ -1 \\ 2 \end{pmatrix} \begin{pmatrix} -2 & -1 & 2 \end{pmatrix} \quad (3)$$

$$= \sqrt{9} = 3 \quad (4)$$

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

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

$$= 3 \begin{pmatrix} -2 \\ -1 \\ 2 \end{pmatrix} \quad (6)$$

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

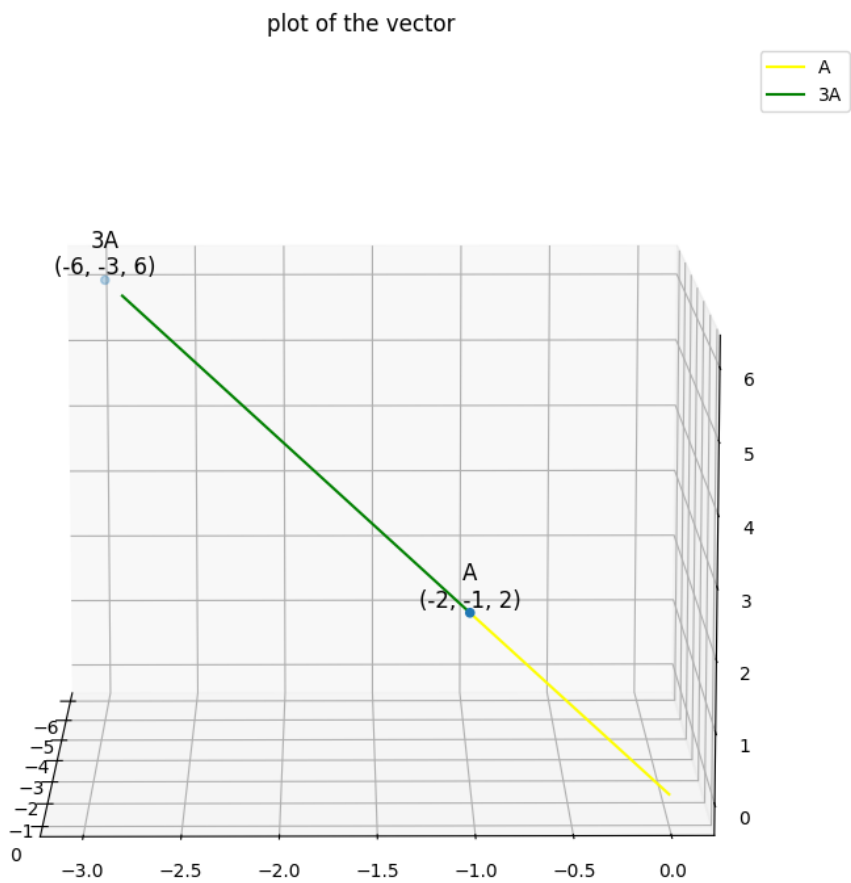


Fig. 1: Plot of the vectors