

# 1-1.10-10

EE24BTECH11005 - Arjun Pavanje

Question:

The vector in the direction of the vector  $\begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$  that has magnitude 9 is

1)  $\begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$

2)  $\begin{pmatrix} 1 \\ -2 \\ 0 \end{pmatrix}$

3)  $3 \begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$

4)  $9 \begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$

| Variable | Description   |
|----------|---|
| <b>A</b> | $\begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$ vector |

TABLE I: Variables Used

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

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

$$\|\mathbf{A}\| = \mathbf{A}^T \mathbf{A} \quad (2)$$

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

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

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

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

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

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

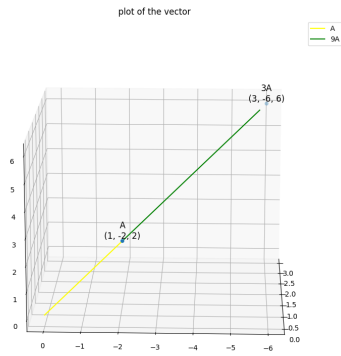


Fig. 1: Plot of the vectors