## **ASSIGNMENT 1**

**Question :** Find a vector of magnitude 5 units, and parallel to the resultant of the vectors  $\mathbf{a} = 2\hat{i} + 3\hat{j} - \hat{k}$  and  $\mathbf{b} = \hat{i} - 2\hat{j} + \hat{k}$ .

Solution:

$$\mathbf{a} = \begin{pmatrix} 2\\3\\-1 \end{pmatrix}, \mathbf{b} = \begin{pmatrix} 1\\-2\\1 \end{pmatrix} \tag{1}$$

$$\mathbf{a} + \mathbf{b} = \mathbf{c} = \begin{pmatrix} 3 \\ 1 \\ 0 \end{pmatrix} \tag{2}$$

$$\|\mathbf{a} + \mathbf{b}\| = \|\mathbf{c}\| = \sqrt{10} \tag{3}$$

$$\hat{c} = \frac{\mathbf{c}}{\|\mathbf{c}\|} \tag{4}$$

$$\implies \hat{c} = \frac{1}{\sqrt{10}} \begin{pmatrix} 3\\1\\0 \end{pmatrix} \tag{5}$$

So, the unit vector is

$$\pm 5\hat{c} = \pm \frac{\sqrt{10}}{2} \begin{pmatrix} 3\\1\\0 \end{pmatrix} \tag{6}$$