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 :

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

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

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

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

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

So,the unit vector is

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