Assignment 1

Tanay Yadav - AI20BTECH11026

Download the latex-tikz codes from:

https://github.com/tanayyadav28/EE3900–Assignments/blob/main/Assignment%201/Assignment_1.tex

1 Problem

[Vectors Q2; Q23]
Find a unit vector in the direction of $\mathbf{a}$+$\mathbf{b}$ where,

$$\mathbf{a} = \begin{bmatrix} 2 \\ 2 \\ -5 \end{bmatrix}, \mathbf{b} = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix} \tag{1.0.1}$$

2 Solution

Let $\mathbf{c}$ be the vector $\mathbf{a} + \mathbf{b}$

$$\mathbf{c} = \mathbf{a} + \mathbf{b} \tag{2.0.1}$$

$$\therefore \mathbf{c} = \begin{bmatrix} 4 \\ 3 \\ -2 \end{bmatrix} \tag{2.0.2}$$

Now,

$$\|\mathbf{c}\| = \sqrt{(4)^2 + (3)^2 + (-2)^2} \tag{2.0.3}$$

$$\therefore \|\mathbf{c}\| = \sqrt{29} \tag{2.0.4}$$

Let $\mathbf{h}$ be the unit vector in the direction of $\mathbf{c}$.

$$\mathbf{h} = \frac{\mathbf{c}}{\|\mathbf{c}\|} \tag{2.0.5}$$

$$\therefore \mathbf{h} = \frac{1}{\sqrt{29}} \begin{bmatrix} 4 \\ 3 \\ -2 \end{bmatrix} \tag{2.0.6}$$

Hence, $\mathbf{h}$ is the required unit vector.