1.1.10.26

EE24BTECH11059 - Yellanki Siddhanth

Question:
Find the unit vector in the direction of the sum of the vectors, $a = 2\hat{i} + 2\hat{j} - 5\hat{k}$ and $b = 2\hat{i} + \hat{j} + 3\hat{k}$
Solution:

Variable	Description	Formula
a	A vector	$A = \begin{pmatrix} 2 \\ 2 \\ -5 \end{pmatrix}$
b	A vector	$B = \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix}$
c	Unit vector in the direction of $a + b$	$c = \frac{a+b}{\|a+b\|}$

TABLE 0

To calculate the c,

$$a + b = \begin{pmatrix} 2 \\ 2 \\ -5 \end{pmatrix} + \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix} = \begin{pmatrix} 4 \\ 3 \\ -2 \end{pmatrix} \tag{0.1}$$

Calculating $\|a + b\|$, using the formula $\|c\| = \sqrt{c_x^2 + c_y^2 + c_z^2}$

$$\|a + b\| = \sqrt{4^2 + 3^2 + 2^2} = \sqrt{29} \tag{0.2}$$

$\therefore$ c is,

$$c = \frac{a + b}{\|a + b\|} = \frac{1}{\sqrt{29}} \begin{pmatrix} 4 \\ 3 \\ -2 \end{pmatrix} \tag{0.3}$$

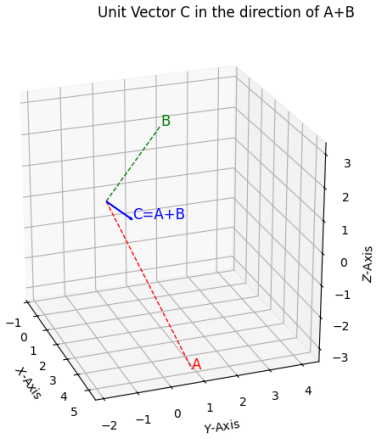

Fig. 0.1