Assignment 2

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Question

Find a unit vector in the direction of the line passing through $A = \begin{pmatrix} -2 \\ 4 \\ -5 \end{pmatrix}$ and $B = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$

Solution

Given:- $A = \begin{pmatrix} -2 \\ 4 \\ -5 \end{pmatrix}$ and $B = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$

$$AB = B - A \tag{1}$$

$$= \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} - \begin{pmatrix} -2 \\ 4 \\ -5 \end{pmatrix} \tag{2}$$

$$= \begin{pmatrix} 3 \\ -2 \\ 8 \end{pmatrix} \tag{3}$$

Magnitude of vector AB

$$\|\mathrm{AB}\| = \sqrt{(3)^2 + (-2)^2 + (8)^2} \tag{4}$$

$$= \sqrt{9 + 4 + 64} = \sqrt{77} \tag{5}$$

The unit vector is calculated as

$$\frac{\mathrm{AB}}{\|\mathrm{AB}\|} = \frac{\begin{pmatrix} 3 \\ -2 \\ 8 \end{pmatrix}}{\left\| \begin{pmatrix} 3 \\ -2 \\ 8 \end{pmatrix} \right\|} \tag{6}$$

$$= \frac{1}{\sqrt{77}} \begin{pmatrix} 3 \\ -2 \\ 8 \end{pmatrix} \tag{7}$$

Codes

Python code ▸ Link

The latex- tikz code ▸ Link