Assignment No.2

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Download latex-tikz codes from

https://github.com/Panisha707/ASSIGNMENT02/blob/main/main.tex

Question taken from

Vectors, Excercise 2.22

1 Question No 1

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

2 Solution

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

$$\mathbf{AB} = \mathbf{B} - \mathbf{A} \tag{2.0.1}$$

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

$$= \begin{pmatrix} 3 \\ -2 \\ 8 \end{pmatrix} \tag{2.0.2}$$

Magnitude of vector **AB**

$$\|\mathbf{AB}\| = \sqrt{(3)^2 + (-2)^2 + (8)^2} \tag{2.0.3}$$

$$= \sqrt{9 + 4 + 64} = \sqrt{77} \tag{2.0.4}$$

The unit vector is calculated as

$$\frac{\mathbf{AB}}{\|\mathbf{AB}\|} = \frac{\begin{pmatrix} 3 \\ -2 \\ 8 \end{pmatrix}}{\left\| \begin{pmatrix} 3 \\ -2 \\ 8 \end{pmatrix} \right\|} \tag{2.0.5}$$

$$= \frac{1}{\sqrt{77}} \begin{pmatrix} 3 \\ -2 \\ 8 \end{pmatrix} \tag{2.0.6}$$