1

ASSIGNMENT 2

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Download all python codes from

https://github.com/Y.Nagarani/ASSIGNMENT2/tree/main/CODES

and latex-tikz codes from

https://github.com/Y.Nagarani/ASSIGNMENT2/ tree/main

1 Question No 2.15

Find the equation of the line passing through $\begin{pmatrix} -3 \\ 5 \end{pmatrix}$ and perpendicular to the line through the points $\begin{pmatrix} 2 \\ 5 \end{pmatrix}$ and $\begin{pmatrix} -3 \\ 6 \end{pmatrix}$

2 SOLUTION

$$\mathbf{A} = \begin{pmatrix} 2 \\ 5 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} -3 \\ 6 \end{pmatrix} \tag{2.0.1}$$

If the direction vector is $\begin{pmatrix} 1 \\ m \end{pmatrix}$ (2.0.2)

$$\mathbf{m} = \begin{pmatrix} -3\\6 \end{pmatrix} - \begin{pmatrix} 2\\5 \end{pmatrix} \tag{2.0.3}$$

$$\mathbf{m} = \begin{pmatrix} -5\\1 \end{pmatrix} \tag{2.0.4}$$

Given point $\mathbf{P} = \begin{pmatrix} -3 \\ 5 \end{pmatrix}$ and $\mathbf{m} = 5$. The direction vector is $\mathbf{m} = \begin{pmatrix} 1 \\ 5 \end{pmatrix}$. Hence, the normal vector

$$\mathbf{n} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \mathbf{m} \tag{2.0.5}$$

$$= \begin{pmatrix} -5\\1 \end{pmatrix} \tag{2.0.6}$$

The equation of the line in terms of the normal vector is then obtained as

$$\mathbf{n}^T \left(\mathbf{x} - \mathbf{P} \right) = 0 \tag{2.0.7}$$

$$\implies (5 -1)\mathbf{x} = 20 \tag{2.0.8}$$

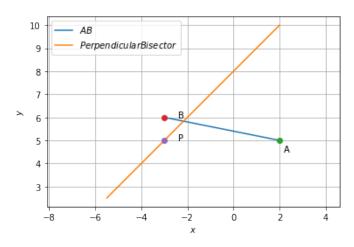


Fig. 0: Perpendicular Bisector