

# 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  $\begin{pmatrix} -3 \\ 6 \end{pmatrix}$

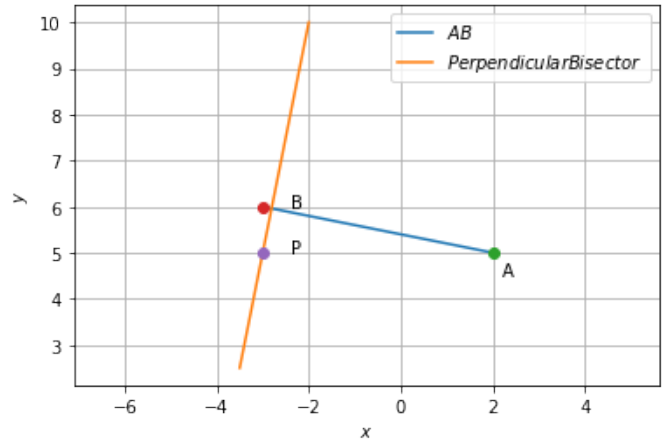


Fig. 0: Perpendicular Bisector

## 2 SOLUTION

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

$$\mathbf{m} = \begin{pmatrix} -3 \\ 6 \end{pmatrix} - \begin{pmatrix} 2 \\ 5 \end{pmatrix} \quad (2.0.2)$$

$$\mathbf{m} = \begin{pmatrix} -5 \\ 1 \end{pmatrix} \quad (2.0.3)$$

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

$$\mathbf{n} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \mathbf{m} \quad (2.0.4)$$

$$= \begin{pmatrix} -5 \\ 1 \end{pmatrix} \quad (2.0.5)$$

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

$$\mathbf{n}^T (\mathbf{x} - \mathbf{P}) = 0 \quad (2.0.6)$$

$$\implies \begin{pmatrix} 5 & -1 \end{pmatrix} \mathbf{x} = 20 \quad (2.0.7)$$