

# 1-1.8-21

EE24BTECH11060 - Sruthi Bijili

## Question:

Find a point which is equidistant from the points  $(-5, 4)$  and  $(-1, 6)$ . How many such points are there ?

## solution:

Variable	Description	formula
$\mathbf{A}(-5, 4)$	coordinates of first point	—
$\mathbf{B}(-1, 6)$	coordinates of second point	—
$\mathbf{C}$	midpoint of $\mathbf{A}$ and $\mathbf{B}$	—
$k$	ratio in which $\mathbf{c}$ divides the line joining $AB$	$\frac{\mathbf{B}+k\mathbf{A}}{k+1}$

TABLE 0: Variables Used

$$\|\mathbf{C} - \mathbf{A}\| = \|\mathbf{C} - \mathbf{B}\| \quad (0.1)$$

$$\Rightarrow \|\mathbf{C} - \mathbf{A}\|^2 = \|\mathbf{C} - \mathbf{B}\|^2 \quad (0.2)$$

$$\Rightarrow \|\mathbf{C}\|^2 - 2\mathbf{C}^T \mathbf{A} + \|\mathbf{A}\|^2 = \|\mathbf{C}\|^2 - 2\mathbf{C}^T \mathbf{B} + \|\mathbf{B}\|^2 \quad (0.3)$$

$$\Rightarrow (A - B)^2 \mathbf{C} = \frac{\|\mathbf{A}\|^2 - \|\mathbf{B}\|^2}{2} \quad (0.4)$$

$$\text{by substituting the values from table} \quad (0.5)$$

$$\Rightarrow 2x + y = -1 \quad (0.6)$$

$$\text{if } x = -3 \quad (0.7)$$

$$\Rightarrow y = 5 \quad (0.8)$$

$$\mathbf{C} = \begin{pmatrix} -3 \\ 5 \end{pmatrix} \quad (0.9)$$

There are infinitely many points that are equidistant from the points  $(-5, 4)$  and  $(-1, 6)$

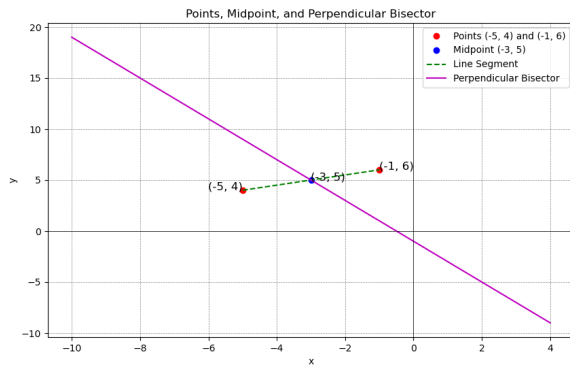


Fig. 0.1: circle with diameter AB