

1.1.5.15

EE24BTECH11045 - N.Tapasvi

Question:

The midpoint of the line segment joining $\mathbf{A} \begin{pmatrix} 2a \\ 4 \end{pmatrix}$ and $\mathbf{B} \begin{pmatrix} -2 \\ 3b \end{pmatrix}$ is $\mathbf{P} \begin{pmatrix} 1, 2a \\ 1 \end{pmatrix}$. Find the values of a and b. (10,2019)

Solution:

Variable	Description
A	$\begin{pmatrix} 2a \\ 4 \end{pmatrix}$
B	$\begin{pmatrix} -2 \\ 3b \end{pmatrix}$
C(Midpoint)	$\begin{pmatrix} 1 \\ 2a + 1 \end{pmatrix}$
a, b	Values to be found

TABLE I: Variables Used

The equations in standard form are:

$$2a - 0b = 4 \Rightarrow \begin{bmatrix} 2 & 0 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 4 \end{bmatrix}$$

$$0a + 3b = 6 \Rightarrow \begin{bmatrix} 0 & 3 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 6 \end{bmatrix}$$

We can represent these equations as a matrix:

$$\begin{bmatrix} 2 & 0 \\ 0 & 3 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} 4 \\ 6 \end{bmatrix}$$

Solving the Matrix Equation.

After solving the equation, the values of a and b are

a=2 b=2

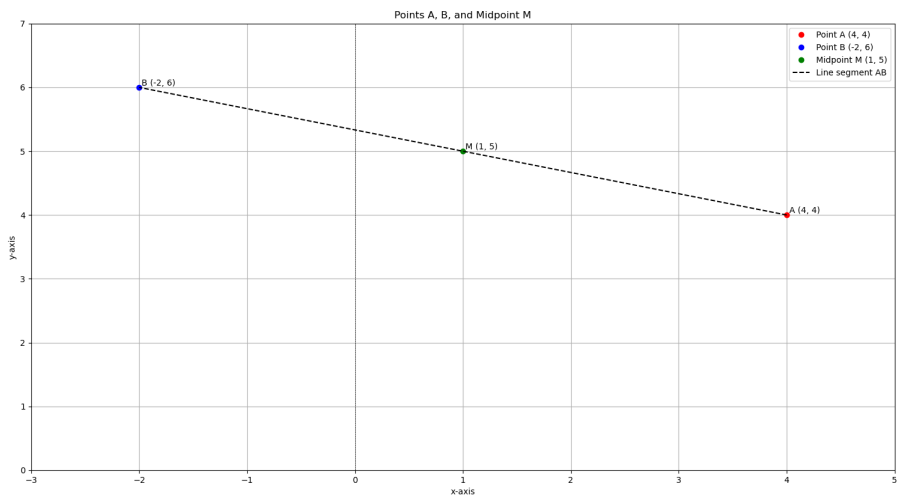


Fig. 1: Plot of the points A,B,P