1.3.3

AI25BTECH11024 - Pratyush Panda

Question:

Points $\mathbf{A}(3,1)$, $\mathbf{B}(5,1)$, $\mathbf{C}(a,b)$, and $\mathbf{D}(4,3)$ are vertices of a parallelogram $ABCD$. Find the values of a and b.

Solution:

Given:

$$\mathbf{A} = \begin{pmatrix}3\\1\end{pmatrix}, \mathbf{B} = \begin{pmatrix}5\\1\end{pmatrix}, \mathbf{C} = \begin{pmatrix}a\\b\end{pmatrix}, \mathbf{D} = \begin{pmatrix}4\\3\end{pmatrix}$$

The point $\mathbf{C}$ can be found by equating the mid-point of both the diagonals of the parallelogram:

$$\frac{\mathbf{D}+\mathbf{B}}{2} = \frac{\mathbf{A}+\mathbf{C}}{2} \tag{0.1}$$

$$\mathbf{C} = \mathbf{D} + \mathbf{B} - \mathbf{A} \tag{0.2}$$

$$\mathbf{C} = \begin{pmatrix}4\\3\end{pmatrix} + \begin{pmatrix}5\\1\end{pmatrix} - \begin{pmatrix}3\\1\end{pmatrix} \tag{0.3}$$

$$\mathbf{C} = \begin{pmatrix}6\\3\end{pmatrix} \tag{0.4}$$

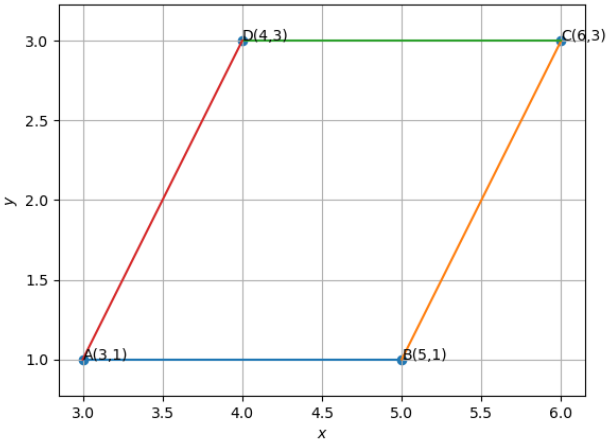

Fig. 0.1