1.3.3

AI25BTECH11024 - Pratyush Panda

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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 that

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

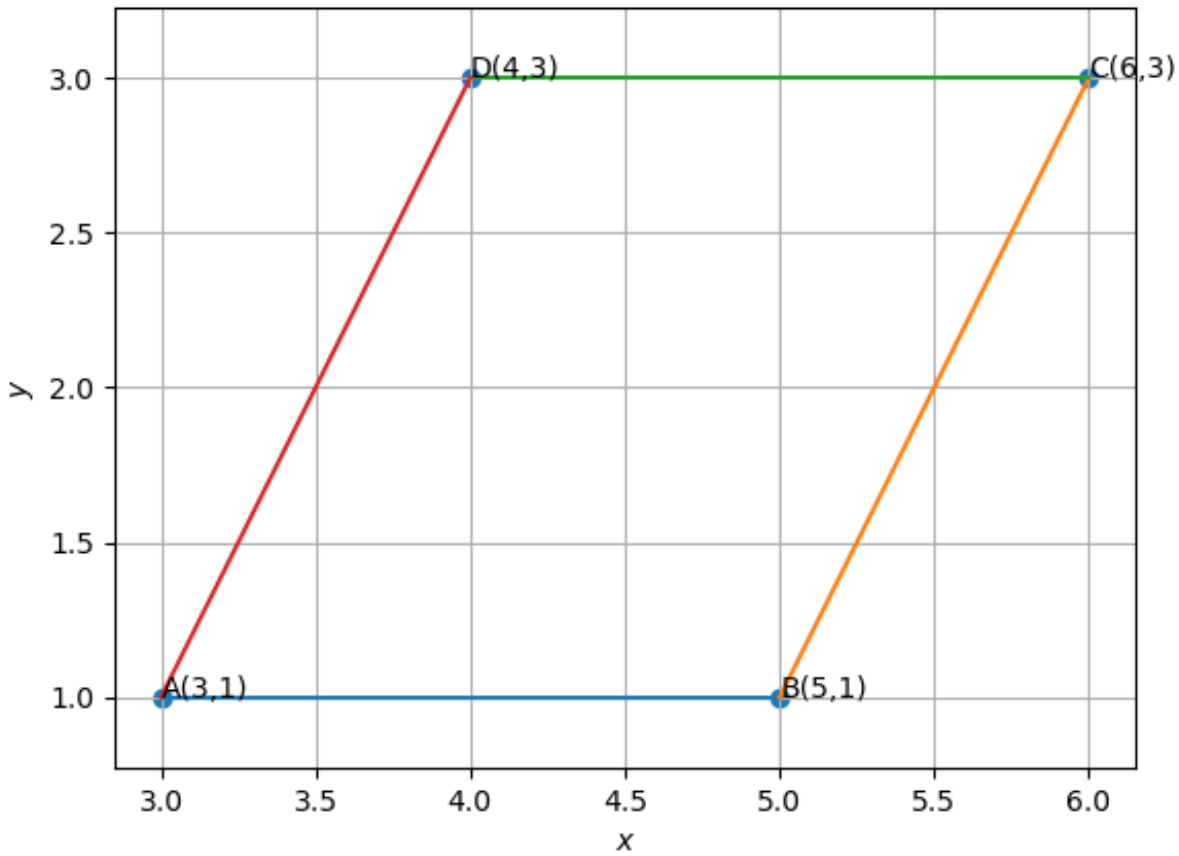
The point $\mathbf{C}$ can be found by equating the mid-point of both the diagonals of the parallelogram:

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

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

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

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


D(4,3)
C(6,3)
A(3,1)
B(5,1)
3.0
2.5
2.0
1.5
1.0
y
3.0
3.5
4.0
4.5
5.0
5.5
6.0
x