

# MatGeo Assignment 1.2.13

AI25BTECH11007

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# Question

If  $(1, 2)$ ,  $(4, y)$ ,  $(x, 6)$  and  $(3, 5)$  are the vertices of a parallelogram taken in order, find  $x$  and  $y$ .

# Theoretical Solution

Let us solve the given equation theoretically and then verify the solution computationally

According to the question,

We are given the vertices of a parallelogram in order:

$$A(1, 2), B(4, y), C(x, 6), D(3, 5).$$

**In a parallelogram, the diagonals bisect each other. So, the midpoints of the diagonals are equal.**

# Theoretical Solution

Given the vertices of a parallelogram:

$$A(1, 2), B(4, y), C(x, 6), D(3, 5).$$

Property: In a parallelogram, diagonals bisect each other. Midpoint of AC = Midpoint of BD

$$\frac{1}{2} \begin{pmatrix} 1+x \\ 2+6 \end{pmatrix} = \frac{1}{2} \begin{pmatrix} 4+3 \\ y+5 \end{pmatrix} \quad (1)$$

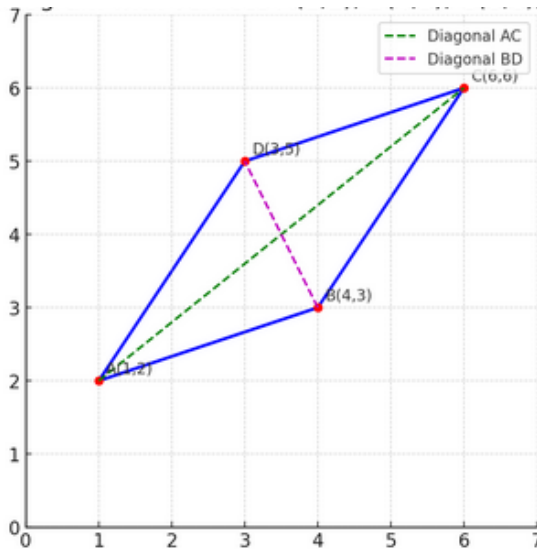
$$\begin{pmatrix} \frac{1+x}{2} \\ \frac{8}{2} \end{pmatrix} = \begin{pmatrix} \frac{7}{2} \\ \frac{y+5}{2} \end{pmatrix} \quad (2)$$

$$\frac{1+x}{2} = \frac{7}{2}, \quad \frac{8}{2} = \frac{y+5}{2} \quad (3)$$

$$x = 6, \quad y = 3 \quad (4)$$

$$\therefore x = 6, y = 3 \quad (5)$$

# Plot



# Conclusion

From the figure it is clearly verified that theoretical solution matches with the computational solution.