MatGeo Assignment 1.2.13

AI25BTECH11007

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

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

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

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

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

$$\Rightarrow x = 6, \quad y = 3$$

$$\therefore\ x = 6,\ y = 3$$

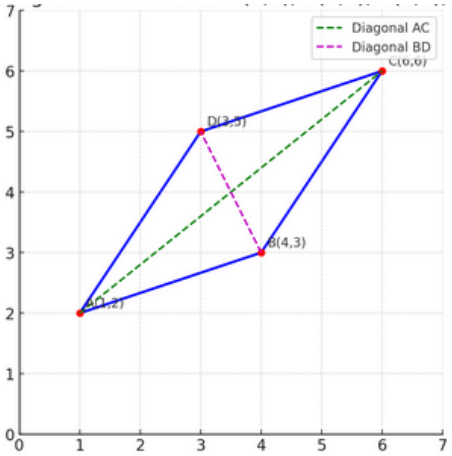

Fig. 0.1: The visual of the parallelogram with vertices labeled and diagonals shown

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