1.2.12

EE24BTECH11020 - Ellanti Rohith

Question:

If $\begin{pmatrix}1\\2\end{pmatrix}$, $\begin{pmatrix}4\\y\end{pmatrix}$, $\begin{pmatrix}x\\6\end{pmatrix}$ and $\begin{pmatrix}3\\5\end{pmatrix}$ are the vertices of parallelogram taken in order, find x and y.

Solution:

Let ABCD be the given Parallelogram,

TABLE 0: Coordinates of the vertices of parallelogram ABCD

Vertex	Coordinates
A	(1, 2)
B	(4, y)
C	(x, 6)
D	(3, 5)

we know that **AB** is parallel to **DC** and $\|AB\| = \|DC\|$

Then,

$$\mathbf{B} - \mathbf{A} = \mathbf{C} - \mathbf{D} \tag{0.1}$$

$$\begin{pmatrix}4\\y\end{pmatrix} - \begin{pmatrix}1\\2\end{pmatrix} = \begin{pmatrix}x\\6\end{pmatrix} - \begin{pmatrix}3\\5\end{pmatrix} \tag{0.2}$$

$$\begin{pmatrix}3\\y-2\end{pmatrix} = \begin{pmatrix}x-3\\1\end{pmatrix} \tag{0.3}$$

From equation (0.3),

$$3 = x - 3 \Rightarrow x = 6 \tag{0.4}$$

$$y - 2 = 1 \Rightarrow y = 3 \tag{0.5}$$

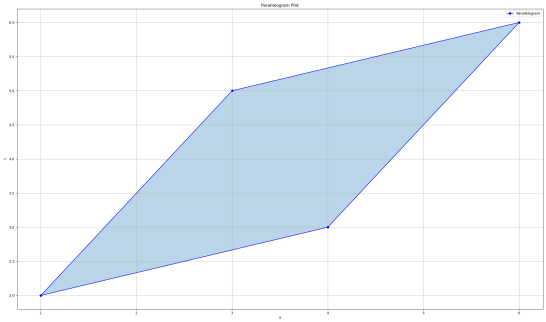

Fig. 0.1: Plot of parallelogram ABCD