1.2.12

AI25BTECH11006 - Nikhila

Question:

If the points **A**(6,1),**B**(8,2),**C**(9,4) and **D**(p,3) are the vertices of a parallelogram,taken in order. find the value of p .

Solution:

The vector components of the given points $\mathbf{A}\begin{pmatrix}6\\1\end{pmatrix}, \mathbf{B}\begin{pmatrix}8\\2\end{pmatrix}, \mathbf{C}\begin{pmatrix}9\\4\end{pmatrix}$ and $\mathbf{D}\begin{pmatrix}p\\3\end{pmatrix}$

If ABCD be a parallelogram with AB || CD ,

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

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix}8\\2\end{pmatrix} - \begin{pmatrix}6\\1\end{pmatrix} = \begin{pmatrix}2\\1\end{pmatrix} \tag{0.2}$$

$$\mathbf{C} - \mathbf{D} = \begin{pmatrix}9\\4\end{pmatrix} - \begin{pmatrix}p\\3\end{pmatrix} = \begin{pmatrix}9-p\\1\end{pmatrix} \tag{0.3}$$

By comparing

$$9 - p = 2 \tag{0.4}$$

We get

$$p = 7 \tag{0.5}$$

Hence the coordinates of **D** are $\begin{pmatrix}7\\3\end{pmatrix}$ and the value of p is 7.

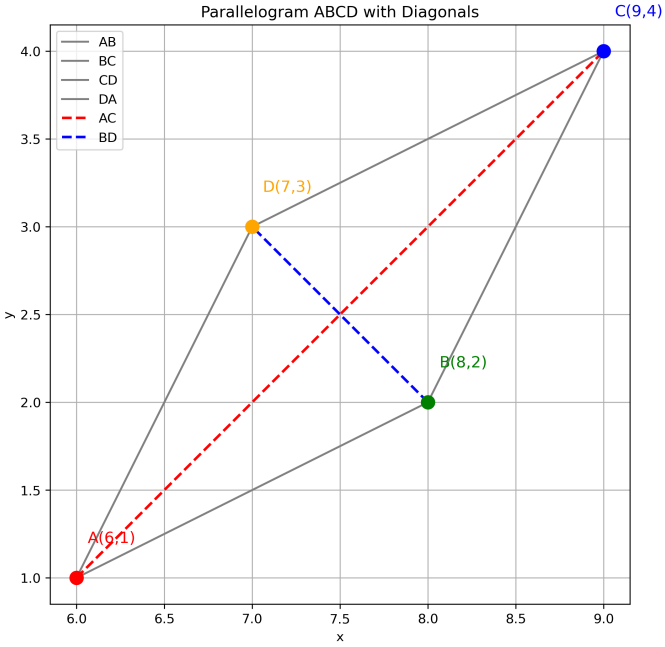
Parallelogram ABCD with Diagonals
C(9,4)
AB
BC
CD
DA
AC
BD
D(7,3)
B(8,2)
A(6,1)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
y
6.0
6.5
7.0
7.5
8.0
8.5
9.0
x

Fig. 0.1