SM5083
Assignment Number 01

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SM21MTECH12014

1. Chapter II Q.17

1.1. Show that (2, 4), (3, 0), (5, 3) and (4, 7) are the vertices of a Parallelogram.

Solution:

In Fig. 1.1

let

$$\mathbf{A} = \begin{pmatrix}2\\4\end{pmatrix}, \mathbf{B} = \begin{pmatrix}3\\0\end{pmatrix}, \mathbf{C} = \begin{pmatrix}5\\3\end{pmatrix}, \mathbf{D} = \begin{pmatrix}4\\7\end{pmatrix} \quad (1.1.1)$$

ABCD can be a ||gm if its opposite sides are parallel i.e

$$\mathbf{A} - \mathbf{B} = k1(\mathbf{C} - \mathbf{D}) \quad (1.1.2)$$

$$\mathbf{A} - \mathbf{D} = k2(\mathbf{B} - \mathbf{C}) \quad (1.1.3)$$

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix}-1\\4\end{pmatrix} \quad (1.1.4)$$

$$\mathbf{C} - \mathbf{D} = \begin{pmatrix}1\\-4\end{pmatrix} \quad (1.1.5)$$

$$\mathbf{A} - \mathbf{D} = \begin{pmatrix}-2\\-3\end{pmatrix} \quad (1.1.6)$$

$$\mathbf{B} - \mathbf{C} = \begin{pmatrix}-2\\-3\end{pmatrix} \quad (1.1.7)$$

From Equation number 1.1.4 ,1.1.5 , 1.1.6, and 1.1.7 ,

$$\mathbf{A} - \mathbf{B} = (-1)(\mathbf{C} - \mathbf{D}) \quad (1.1.8)$$

$$\mathbf{A} - \mathbf{D} = (1)(\mathbf{B} - \mathbf{C}) \quad (1.1.9)$$

Here Opposite sides AB || CD and AD || BC
$\therefore$ *ABCD* is a ||gm as the opposite sides are parallel.

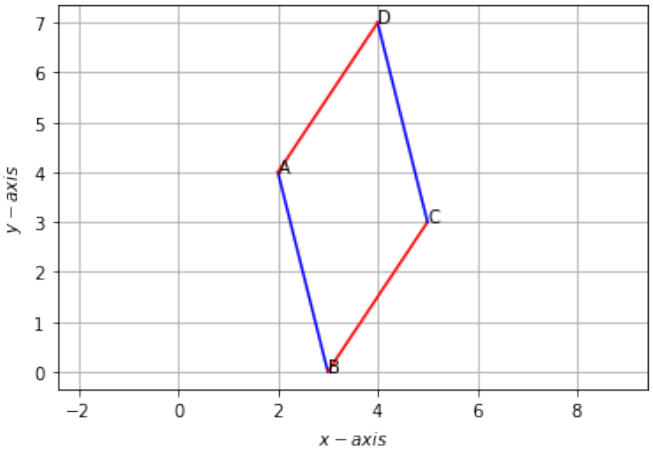

Fig. 1.1. The given points form a parallelogram