

SM5083

Assignment Number 01

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SM21MTECH12014

1. CHAPTER II Q.17

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

Solution:

let

$$\mathbf{A} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 3 \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}, \mathbf{D} = \begin{pmatrix} 4 \\ 7 \end{pmatrix} \quad (1)$$

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

$$\mathbf{A} - \mathbf{B} = k_1(\mathbf{D} - \mathbf{C}) \text{ and } \mathbf{A} - \mathbf{D} = k_2(\mathbf{B} - \mathbf{C}) \quad (2)$$

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} -1 \\ 4 \end{pmatrix}, \quad \mathbf{D} - \mathbf{C} = \begin{pmatrix} -1 \\ 4 \end{pmatrix} \quad (3)$$

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

From Equation Number (3) and (4)

$$\begin{aligned} \mathbf{A} - \mathbf{B} &= (1)(\mathbf{D} - \mathbf{C}) \text{ and} \\ \mathbf{A} - \mathbf{D} &= (1)(\mathbf{B} - \mathbf{C}) \end{aligned} \quad (5)$$

Here Opposite sides $AB \parallel CD$ and $AD \parallel BC$
 $\therefore ABCD$ is a ||gm as the opposite sides are parallel.
Python vector computation code at

<https://github.com/deviith/SM5083/blob/main/Assignment01/Python%20Vector%20Computation.py>

Fig. 0 is generated using

<https://github.com/deviith/SM5083/blob/main/Assignment01/Parallelogram.py>

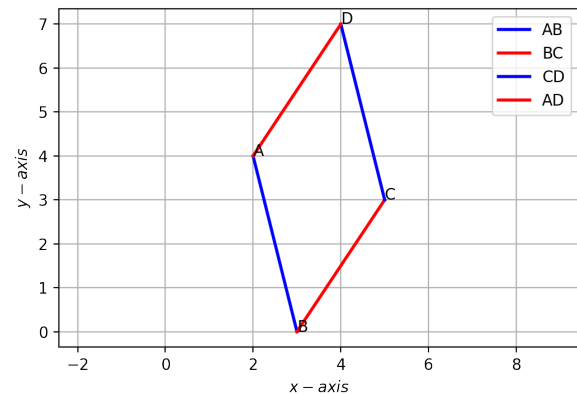


Fig. 0. The given points form a parallelogram