

QUIZ 4

Shristy Sharma (EE22BNITS11001)

1 PROBLEM 1

1. Without using distance formula, show that points $\mathbf{A} = \begin{pmatrix} -2 \\ -1 \end{pmatrix}$, $\mathbf{B} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}$, $\mathbf{C} = \begin{pmatrix} 3 \\ 3 \end{pmatrix}$ and $\mathbf{D} = \begin{pmatrix} -3 \\ 2 \end{pmatrix}$ are the vertices of a parallelogram.

SOLUTION:

Given,

$$\mathbf{A} = \begin{pmatrix} -2 \\ -1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 4 \\ 0 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 3 \\ 3 \end{pmatrix}, \mathbf{D} = \begin{pmatrix} -3 \\ 2 \end{pmatrix} \quad (1.0.1)$$

To show that the given points are the vertices of a parallelogram, we need to show the following;

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

$$2) \mathbf{A} - \mathbf{D} = \mathbf{B} - \mathbf{C}$$

So,

$$\mathbf{A} - \mathbf{B} = \begin{pmatrix} -2 \\ -1 \end{pmatrix} - \begin{pmatrix} 4 \\ 0 \end{pmatrix} \quad (1.0.2)$$

$$= \begin{pmatrix} -6 \\ -1 \end{pmatrix} \quad (1.0.3)$$

$$\mathbf{D} - \mathbf{C} = \begin{pmatrix} -3 \\ 2 \end{pmatrix} - \begin{pmatrix} 3 \\ 3 \end{pmatrix} \quad (1.0.4)$$

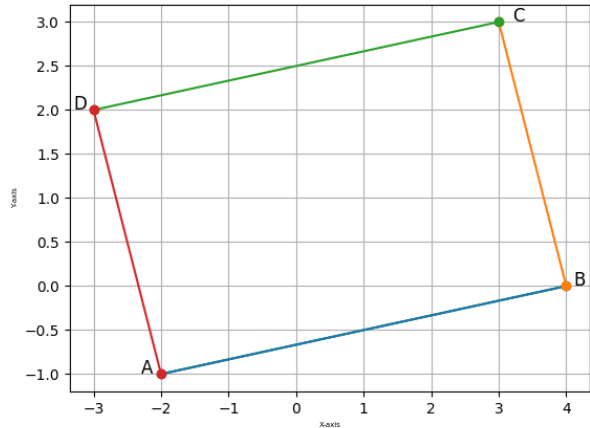
$$= \begin{pmatrix} -6 \\ -1 \end{pmatrix} \quad (1.0.5)$$

$$\mathbf{A} - \mathbf{D} = \begin{pmatrix} -2 \\ -1 \end{pmatrix} - \begin{pmatrix} -3 \\ 2 \end{pmatrix} \quad (1.0.6)$$

$$= \begin{pmatrix} 1 \\ -3 \end{pmatrix} \quad (1.0.7)$$

$$\mathbf{B} - \mathbf{C} = \begin{pmatrix} 4 \\ 0 \end{pmatrix} - \begin{pmatrix} 3 \\ 3 \end{pmatrix} \quad (1.0.8)$$

$$= \begin{pmatrix} 1 \\ -3 \end{pmatrix} \quad (1.0.9)$$



Therefore, we can now say that the given points are the vertices of a parallelogram since both the sides of the quadrilateral are parallel to each other.