

# 1.2.16

AI25BTECH11010 - Dhanush Kumar

**Question:**

Show that  $(-1, 2, 1)$ ,  $(1, -2, 5)$ ,  $(4, -7, 8)$  and  $(2, -3, 4)$  are the vertices of a parallelogram.

**Solution:**

Let

$$\mathbf{A} = \begin{pmatrix} -1 \\ 2 \\ 1 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 1 \\ -2 \\ 5 \end{pmatrix}, \mathbf{C} = \begin{pmatrix} 4 \\ -7 \\ 8 \end{pmatrix}, \mathbf{D} = \begin{pmatrix} 2 \\ -3 \\ 4 \end{pmatrix}. \quad (1)$$

Now,

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} 1 - (-1) \\ -2 - 2 \\ 5 - 1 \end{pmatrix} = \begin{pmatrix} 2 \\ -4 \\ 4 \end{pmatrix}, \quad (2)$$

$$\mathbf{C} - \mathbf{D} = \begin{pmatrix} 4 - 2 \\ -7 - (-3) \\ 8 - 4 \end{pmatrix} = \begin{pmatrix} 2 \\ -4 \\ 4 \end{pmatrix}. \quad (3)$$

Hence,

$$\mathbf{B} - \mathbf{A} = \mathbf{C} - \mathbf{D}. \quad (4)$$

$\Rightarrow$

$$\mathbf{C} - \mathbf{B} = \mathbf{D} - \mathbf{A}. \quad (5)$$

Therefore,  $A, B, C, D$  are the vertices of a parallelogram.

# Parallelogram in 3D

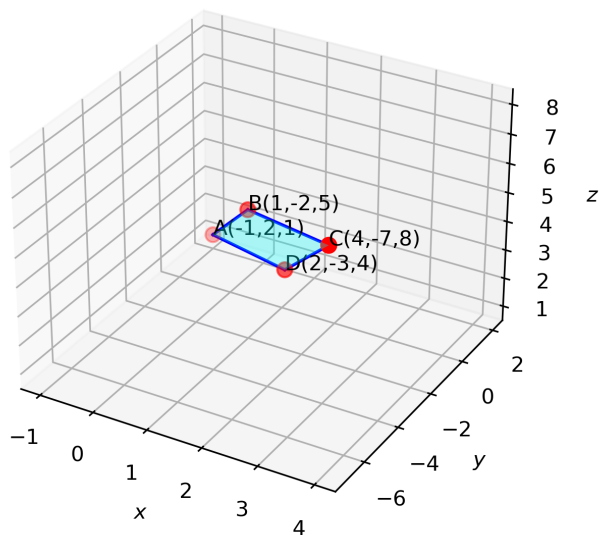


Fig. 0