

1-1.2-17

EE24BTECH11064 - Harshil Rathan

Question:

Three vertices of a parallelogram $ABCD$ are $(A)=(3, -1, 2), (B)=(1, -2, 4)$ and $(C)=(-1, 1, 2)$. Find the coordinates of the fourth vertex.

Solution:

Vertices	Given
A	$(3, -1, 2)$
B	$(1, -2, 4)$
C	$(-1, 1, 2)$
D	(x, y, z)

$$(M) = \frac{(A) + (C)}{2} \quad (0.1)$$

$$(P) = \frac{(B) + (D)}{2} \quad (0.2)$$

$$(M) = (P) \quad (0.3)$$

$$(M) = \frac{\begin{pmatrix} 3 \\ -1 \\ 2 \end{pmatrix} + \begin{pmatrix} -1 \\ 1 \\ 2 \end{pmatrix}}{2} \quad (0.4)$$

$$(0.5)$$

$$M = \begin{pmatrix} 1 \\ 0 \\ 2 \end{pmatrix} \quad (0.6)$$

$$(0.7)$$

$$(P) = \frac{\begin{pmatrix} 1 \\ -2 \\ 4 \end{pmatrix} + \begin{pmatrix} x \\ y \\ z \end{pmatrix}}{2} \quad (0.8)$$

$$(0.9)$$

$$P = \begin{pmatrix} \frac{1+x}{2} \\ \frac{y-2}{2} \\ \frac{z+4}{2} \end{pmatrix} \quad (0.10)$$

$$(0.11)$$

Since,

$$(M) = (P) \quad (0.12)$$

$$(0.13)$$

On comparing both sides,

$$x = 1, y = 2, z = 0 \quad (0.14)$$

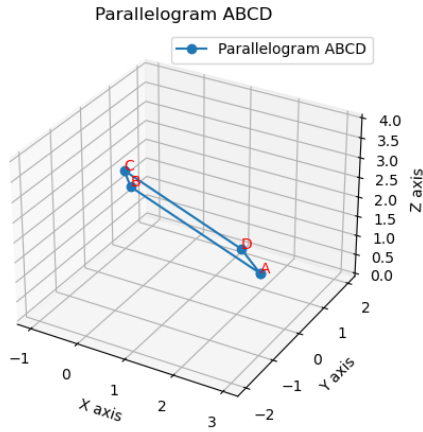


Fig. 0.1: Plot of Parallelogram ABCD