Assignment-2

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I. Vector Arithmetic(CBSE)

Question: $(\mathbf{-1, 2, 1})$, $(\mathbf{1, -2, 5})$, $(\mathbf{4, -7, 8})$) and $(\mathbf{2, -3, 4})$ are the vertices of a parallelogram.

Variable	Value	Description
A	$(\mathbf{-1, 2, 1})$	Vertex **A**
B	$(\mathbf{1, -2, 5})$	Vertex **B**
C	$(\mathbf{4, -7, 8})$	Vertex **C**
D	$(\mathbf{2, -3, 4})$	Vertex **D**

Table 1
Variables Used

Solution: property : opposite sides of parallelogram are equal.

$\mathbf{A}(-1, 2, 1)$, $\mathbf{B}(1, -2, 5)$, $\mathbf{C}(4, -7, 8)$, $\mathbf{D}(2, -3, 4)$

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

$$BC = C - B = \begin{pmatrix} 4-1, -7-(-2), 8-5 \end{pmatrix} = \begin{pmatrix} 3, -5, 3 \end{pmatrix} \tag{2}$$

$$CD = D - C = \begin{pmatrix} 2-4, -3-(-7), 4-8 \end{pmatrix} = \begin{pmatrix} -2, 4, -4 \end{pmatrix} \tag{3}$$

$$DA = A - D = \begin{pmatrix} -1-2, 2-(-3), 1-4 \end{pmatrix} = \begin{pmatrix} -3, 5, -3 \end{pmatrix} \tag{4}$$

Verify if AB is equal to CD and BC is equal to DA:

$$AB + CD = \begin{pmatrix} 2, -4, 4 \end{pmatrix} + \begin{pmatrix} -2, 4, -4 \end{pmatrix} = \begin{pmatrix} 0, 0, 0 \end{pmatrix} \tag{5}$$

$$BC + DA = \begin{pmatrix} 3, -5, 3 \end{pmatrix} + \begin{pmatrix} -3, 5, -3 \end{pmatrix} = \begin{pmatrix} 0, 0, 0 \end{pmatrix} \tag{6}$$

Since $AB + CD = 0$ and $BC + DA = 0$, the quadrilateral formed by the points is a parallelogram.

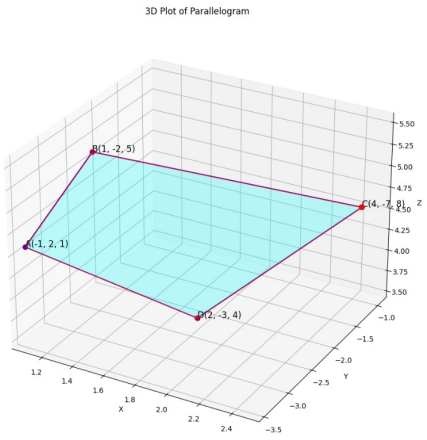

Fig. 1. Stem Plot of y(n)