Assignment-2

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I. VECTOR ARITHMETIC(CBSE)

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

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

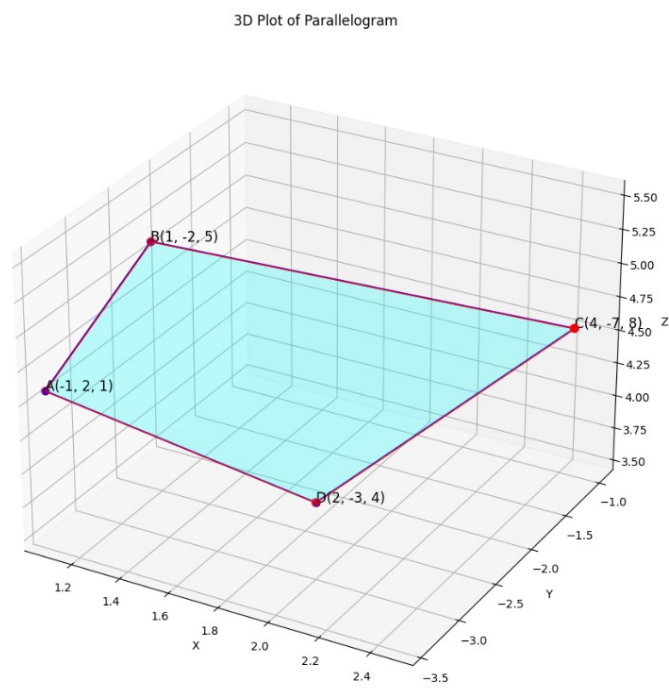Fig. 1. Stem Plot of y(n)