Assignment-2

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I. Vector Arithmeti(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	Description
x	x-coordinate in 3D
y	y-coordinate in 3D
z	z-coordinate in 3D
Plane	$2x + y - z = 5$
Intercept	$\frac{5}{2}, 0, 0$
X-axis	Where $y = 0$ and $z = 0$

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.

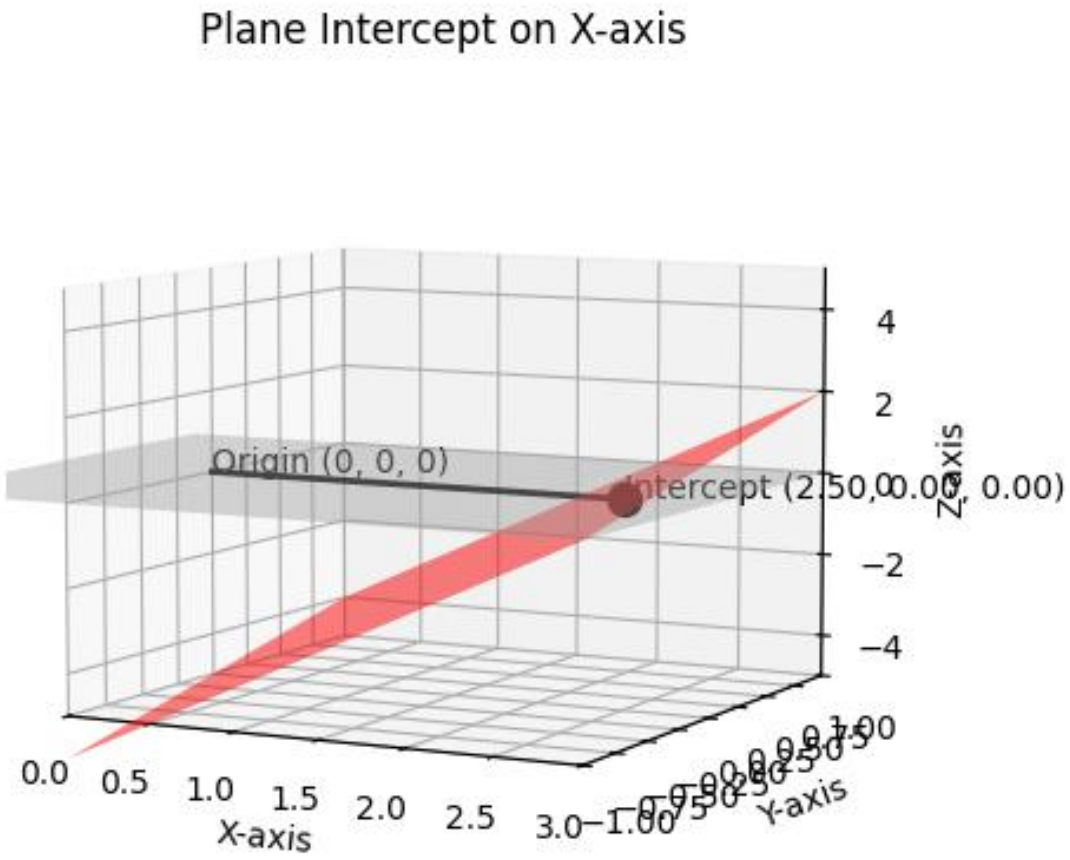

Fig. 1. Stem Plot of y(n)