Assignment-2

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I. Vector Arithmetic(CBSE)

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

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

$\overrightarrow{AB} = B - A = (\mathbf{1}-(-\mathbf{1}),-\mathbf{2}-\mathbf{2},\mathbf{5}-\mathbf{1}) = (\mathbf{2},-\mathbf{4},\mathbf{4})$

$\overrightarrow{BC} = C - B = (\mathbf{4}-\mathbf{1},-\mathbf{7}-(-\mathbf{2}),\mathbf{8}-\mathbf{5}) = (\mathbf{3},-\mathbf{5},\mathbf{3})$

$\overrightarrow{CD} = D - C = (\mathbf{2}-\mathbf{4},-\mathbf{3}-(-\mathbf{7}),\mathbf{4}-\mathbf{8}) = (-\mathbf{2},\mathbf{4},-\mathbf{4})$

$\overrightarrow{DA} = A - D = (-\mathbf{1}-\mathbf{2},\mathbf{2}-(-\mathbf{3}),\mathbf{1}-\mathbf{4}) = (-\mathbf{3},\mathbf{5},-\mathbf{3})$

Verify if $\overrightarrow{AB}$ is equal to $\overrightarrow{CD}$ and $\overrightarrow{BC}$ is equal to $\overrightarrow{DA}$:
$\overrightarrow{AB} + \overrightarrow{CD} = (\mathbf{2},-\mathbf{4},\mathbf{4}) + (-\mathbf{2},\mathbf{4},-\mathbf{4}) = (\mathbf{0},\mathbf{0},\mathbf{0})$

$\overrightarrow{BC} + \overrightarrow{DA} = (\mathbf{3},-\mathbf{5},\mathbf{3}) + (-\mathbf{3},\mathbf{5},-\mathbf{3}) = (\mathbf{0},\mathbf{0},\mathbf{0})$

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

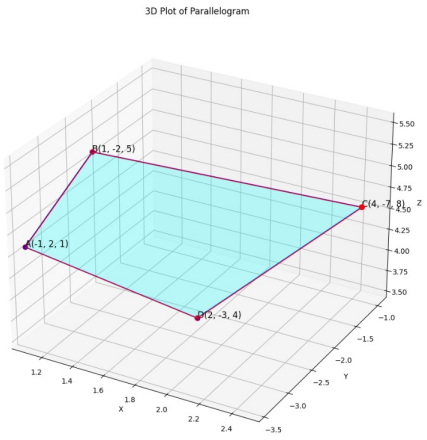

Fig. 1. Stem Plot of y(n)