

1.2.12

AI25BTECH11006 - Nikhila

Question:

If the points **A**(6,1),**B**(8,2),**C**(9,4) and **D**(p,3) are the vertices of a parallelogram,taken in order. find the value of p .

Solution:

| Variable | Description | Formula |
|----------|-----------------------|---------------------------------------------|
| A | A Point to be plotted | $A = \begin{pmatrix} 6 \\ 1 \end{pmatrix}$ |
| B | A Point to be plotted | $B = \begin{pmatrix} 8 \\ 2 \end{pmatrix}$ |
| C | A Point to be plotted | $C = \begin{pmatrix} 5 \\ -6 \end{pmatrix}$ |
| D | A Point to be found | $D = \begin{pmatrix} p \\ 3 \end{pmatrix}$ |

TABLE 0: Variables Used

If ABCD be a parallelogram with $AB \parallel CD$,

$$\mathbf{B} - \mathbf{A} = \mathbf{C} - \mathbf{D}$$

$$\mathbf{B} - \mathbf{A} = \begin{pmatrix} 8 \\ 2 \end{pmatrix} - \begin{pmatrix} 6 \\ 1 \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} \quad (0.1)$$

$$\mathbf{C} - \mathbf{D} = \begin{pmatrix} 9 \\ 4 \end{pmatrix} - \begin{pmatrix} p \\ 3 \end{pmatrix} = \begin{pmatrix} 9 - p \\ 1 \end{pmatrix} \quad (0.2)$$

By comparing

$$9 - p = 2 \quad (0.3)$$

We get

$$p = 7 \quad (0.4)$$

Hence the coordinates of **D** are $\begin{pmatrix} 7 \\ 3 \end{pmatrix}$

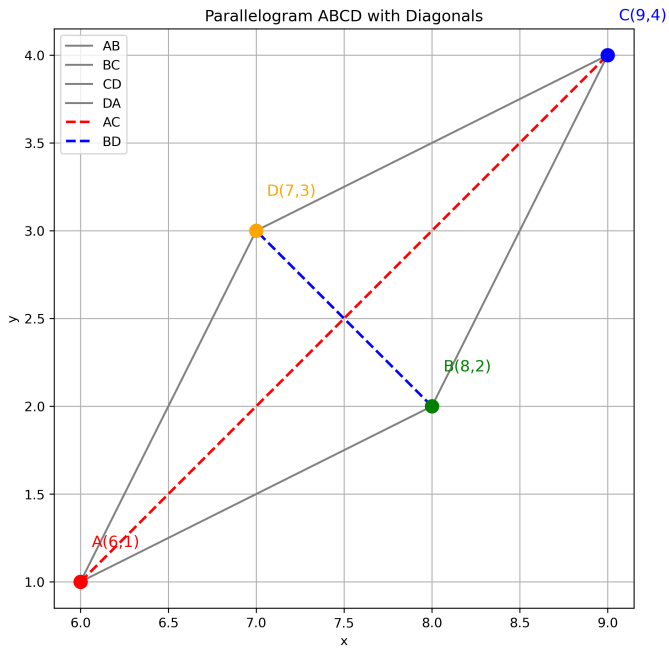


Fig. 0.1: Stem Plot of $y(n)$