

11.9.5

EE23BTECH11029 - Kanishk

Question:

The sum of the first four terms of an A.P. is 56. The sum of the last four terms is 112. If its first term is 11, then find the number of terms.

Solution:

| Symbol | Value | Description |
|---------|-------|-----------------------------------|
| S_1 | 56 | Sum of the first four terms of AP |
| S_2 | 112 | Sum of the last four terms of AP |
| $x(0)$ | 11 | First term of AP |
| d | 2 | Common difference of AP |
| $n + 1$ | 11 | Number of terms of AP |
| $x(n)$ | 31 | Last term of AP |

Input Parameters

$$S_1 = \frac{4}{2} (2x(0) + 3d) \quad (1)$$

$$\frac{4}{2} (2x(0) + 3d) = 56 \quad (2)$$

$$2x(0) + 3d = 28 \quad (3)$$

$$d = 2 \quad (4)$$

$$S_2 = \frac{4}{2} (2x(n) + 3(-d)) \quad (5)$$

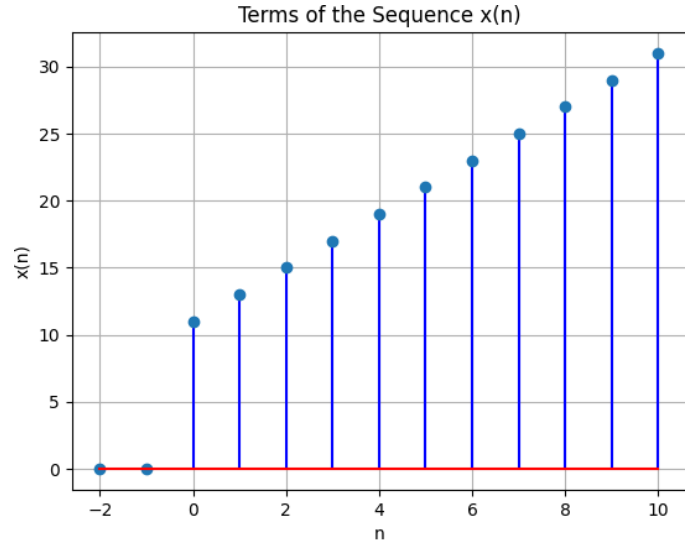
$$\frac{4}{2} (2x(n) + 3(-d)) = 112 \quad (6)$$

$$2x(n) - 3d = 56 \quad (7)$$

$$x(n) = 31 \quad (8)$$

$$x(0) + (n)2 = 31 \quad (9)$$

$$n = 10 \quad (10)$$



Plot $x(n)$ vs n

$$x(n) \xleftrightarrow{Z} X(z) \quad (11)$$

$$x(n) = x(0) + 2n \quad (12)$$

$$X(z) = \sum_{n=-\infty}^{\infty} x(n) Z^{-n} \quad (13)$$

$$= \sum_{n=0}^{\infty} x(0) Z^{-n} + \sum_{n=-0}^{\infty} 2n Z^{-n} \quad (14)$$

$$= \frac{x(0)}{1 - Z^{-1}} + 2 \frac{Z^{-n}}{(1 - Z^{-1})^2}, |Z| > 1 \quad (15)$$

| | | |
|--------|---|------------------------|
| $x(n)$ | $11 + 2n$ | General term of series |
| $X(z)$ | $\frac{11}{1 - Z^{-1}} + 2 \frac{Z^{-n}}{(1 - Z^{-1})^2}$ | Z-transform of $x(n)$ |