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
$y(3)$	56	Sum of the first four terms of AP
$y(n)-y(n-4)$	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

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

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

$$2x(0)+3d = 28 \tag{3}$$

$$d = 2 \tag{4}$$

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

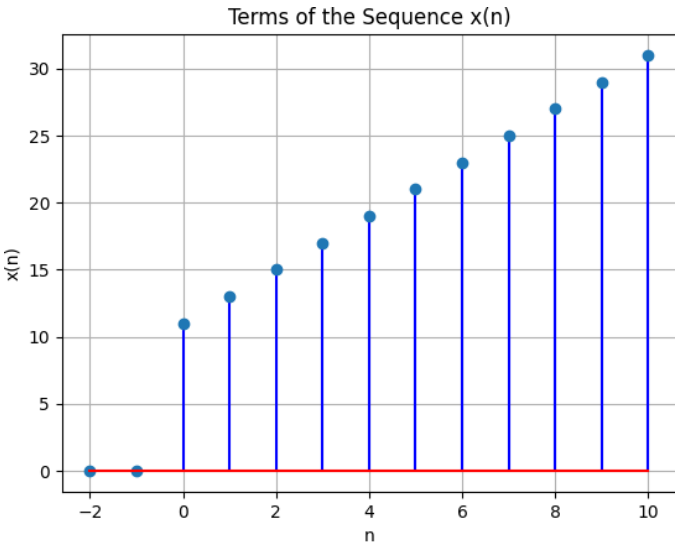
$$\frac{4}{2}(2x(n)+3(-d)) = 112 \tag{6}$$

$$2x(n)-3d = 56 \tag{7}$$

$$x(n) = 31 \tag{8}$$

$$x(0)+(n)2 = 31 \tag{9}$$

$$n = 10 \tag{10}$$



Plot x(n) vs n

$$x(n) \overset{\mathcal{Z}}{\longleftrightarrow} X(z) \tag{11}$$

$$x(n) = x(0)+2n \tag{12}$$

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

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

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