EE23BTECH11047 - Deepakreddy P

Exercise 9.1

4 Write the first five terms of the sequence whose nth term is $\frac{2n-3}{6}$ and obtain the Z transform of the series

Solution:

Symbol	Parameters
x(n)	general term of the series
$X(z)$	Z-transform of x(n)
u(n)	unit step function

TABLE I
Parameters

$$x(n) = \frac{2n-3}{6}\left(u(n)\right) \tag{1}$$

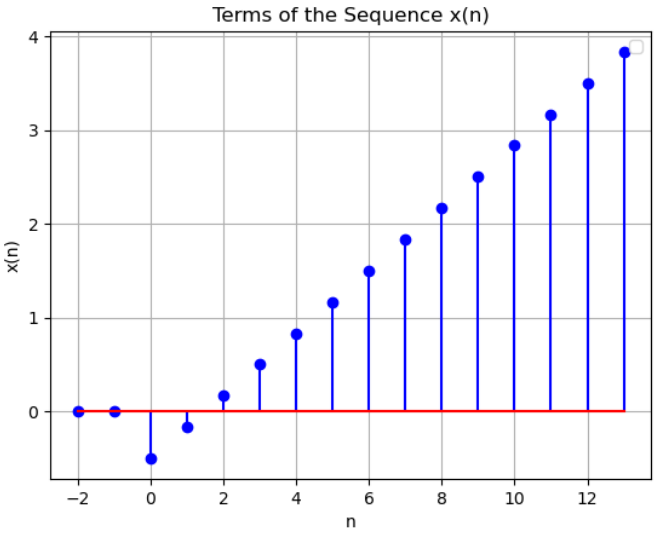

Fig. 1. Plot of x(n) vs n

$$X(z) = \sum_{n=-\infty}^{\infty} x(n)z^{-n} \tag{2}$$

$$= \sum_{n=-\infty}^{\infty} \left(\frac{n}{3} - \frac{1}{2}\right)u(n)z^{-n} \tag{3}$$

$$= \sum_{n=0}^{\infty} \frac{n}{3}z^{-n} - \sum_{n=0}^{\infty} \frac{1}{2}z^{-n} \tag{4}$$

$$X(z) = \frac{5z - 3z^2}{6(z-1)^2} \qquad \{z \in \mathbb{C} : z \neq 1\} \tag{5}$$