

## 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:

$$x(0) = \frac{2 \times 0 - 3}{6} = \frac{-1}{2} \quad (1)$$

$$x(1) = \frac{2 \times 1 - 3}{6} = \frac{-1}{6} \quad (2)$$

$$x(2) = \frac{2 \times 2 - 3}{6} = \frac{1}{6} \quad (3)$$

$$x(3) = \frac{2 \times 3 - 3}{6} = \frac{1}{2} \quad (4)$$

$$x(4) = \frac{2 \times 4 - 3}{6} = \frac{5}{6} \quad (5)$$

$$x(n) = \frac{2n-3}{6} (u(n)) \quad (6)$$

$$X(z) = \sum_{n=-\infty}^{\infty} x(n)Z^{-n} \quad (7)$$

$$= \sum_{n=-\infty}^{\infty} \left(\frac{n}{3} - \frac{1}{2}\right)u(n)z^{-n} \quad (8)$$

$$= \sum_{n=0}^{\infty} \frac{n}{3}z^{-n} - \sum_{n=0}^{\infty} \frac{1}{2}z^{-n} \quad (9)$$

$$\sum_{n=0}^{\infty} \frac{n}{3}z^{-n} = \frac{1}{3} \left( \frac{Z}{(Z-1)^2} \right) \quad (10)$$

$$\sum_{n=0}^{\infty} \frac{1}{2}z^{-n} = \frac{1}{2} \left( \frac{1}{1-z^{-1}} \right) \quad (11)$$

$$X(z) = \frac{1}{3} \frac{z}{(z-1)^2} - \frac{1}{2} \frac{1}{1-z^{-1}} \quad (12)$$

$$X(z) = \frac{5z-3z^2}{6(z-1)^2} \quad \{z \in \mathbb{C} : z \neq 1\} \quad (13)$$

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

TABLE I  
PARAMETERS

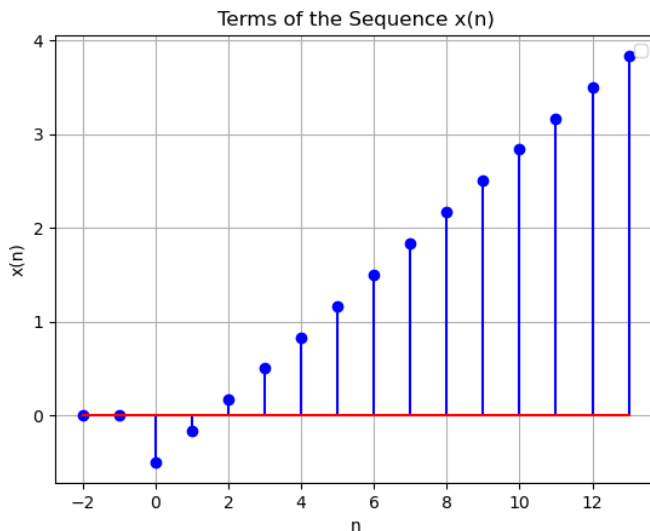


Fig. 1. Plot of x(n) vs n