NCERT Discrete - 11.9.1.2

EE23BTECH11049 - Praful Kesavadas*

Question : 11.9.1.2:
Write the first five terms of the sequence whose n^{th} terms $x\left(n\right) = \frac{n}{n+1}$
Solution:

Term	Value
$x(n)$	$\frac{n}{n+1}u(n)$

Here, Z-transform

$$X(z) = \sum_{i=-\infty}^{\infty} x\left(n\right).z^{-n} \tag{1}$$

$$= \sum_{i=1}^{\infty} \frac{n}{n+1}.z^{-n} \tag{2}$$

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

Now,

$$u\left(n\right) \overset{Z}{\leftrightarrow} \frac{1}{1-z^{-1}}, \quad |z| > 1 \tag{4}$$

$$\frac{-1}{n+1}.u\left(n\right) \overset{Z}{\leftrightarrow} z\log(1-z^{-1}), \quad |z| > 1 \tag{5}$$

$$X(z) = \frac{1}{1-z^{-1}} + z\log\left(1-z^{-1}\right), \quad |z| > 1 \tag{6}$$

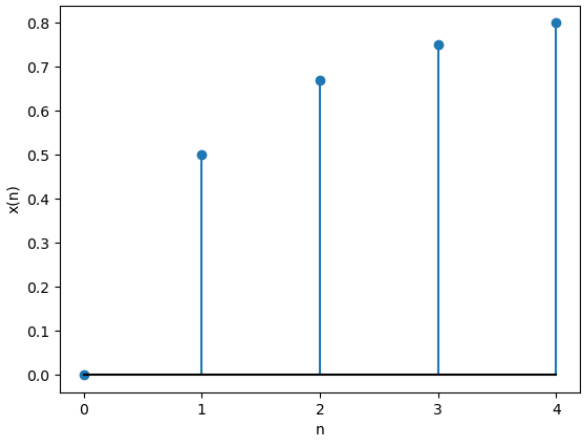

Fig. 0. Stem plot for x(n)