Discrete Assignment
EE1205 Signals and Systems

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EE23BTECH11049

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

Solution:

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

Table 1: Input Parameters: General term

Z-transform is defined as,

$$x\,(n) \overset{z}{\longleftrightarrow} X(z)$$

Here, Z-transform

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

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

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

On solving,

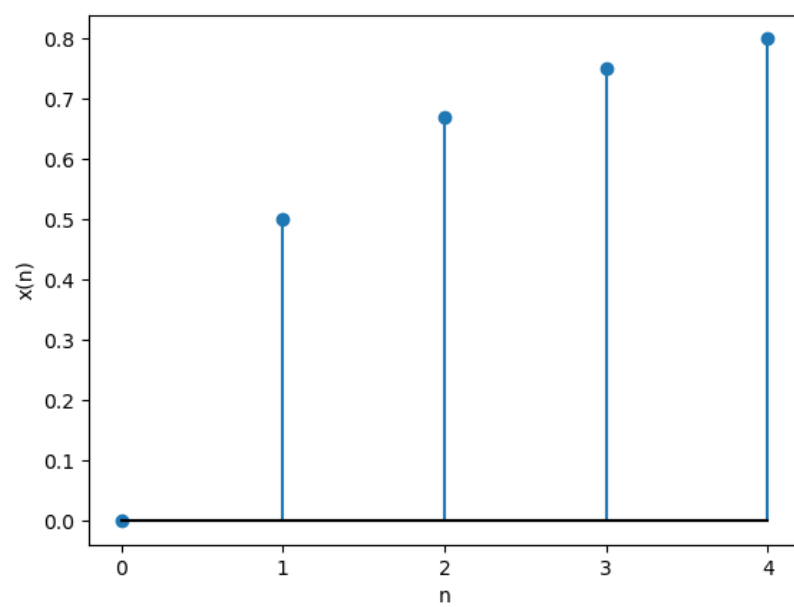$$X(z) = \frac{1}{1-z^{-1}} + z\log\left(1 - z^{-1}\right) \tag{4}$$

Figure 1: Sequence plot generated from Python script