

Discrete Assignment

EE1205 Signals and Systems

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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

Here, Z-transform

$$X(z) = \sum_{i=1}^{\infty} x(n) \cdot z^{-n} \quad (1)$$

$$= \sum_{i=1}^{\infty} \frac{n}{n+1} \cdot z^{-n} \quad (2)$$

$$= \sum_{i=1}^{\infty} u(n) \cdot z^{-n} - \frac{1}{n+1} u(n) \cdot z^{-n} \quad (3)$$

Now,

$$u(n) \xleftrightarrow{Z} \frac{1}{1-z^{-1}} \quad (4)$$

$$\frac{-1}{n+1} \cdot u(n) \xleftrightarrow{Z} z \log(1-z^{-1}) \quad (5)$$

$$X(z) = \frac{1}{1-z^{-1}} + z \log(1-z^{-1}) \quad (6)$$

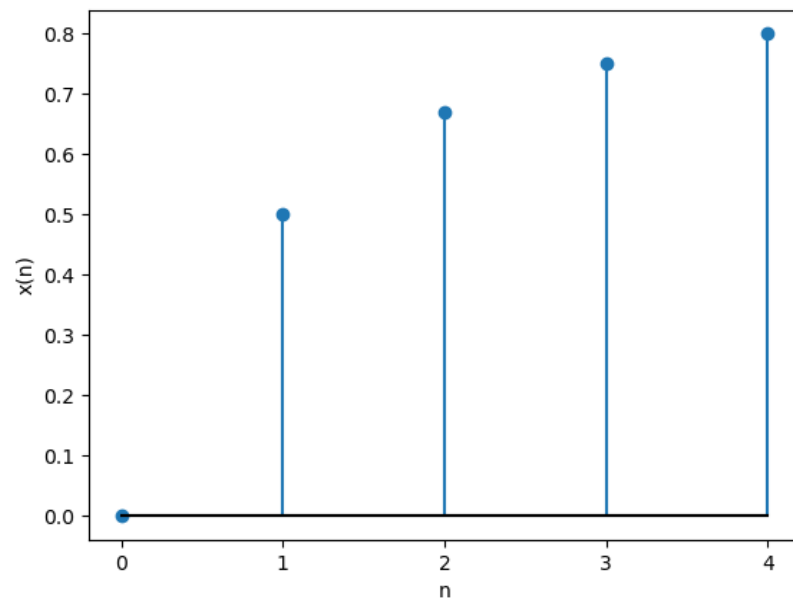


Figure 1: Sequence plot generated from Python script