

# NCERT Discrete - 11.9.1.2

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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:

Here, Z-transform

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

TABLE 0  
INPUT PARAMETERS

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

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

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

Now,

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

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

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

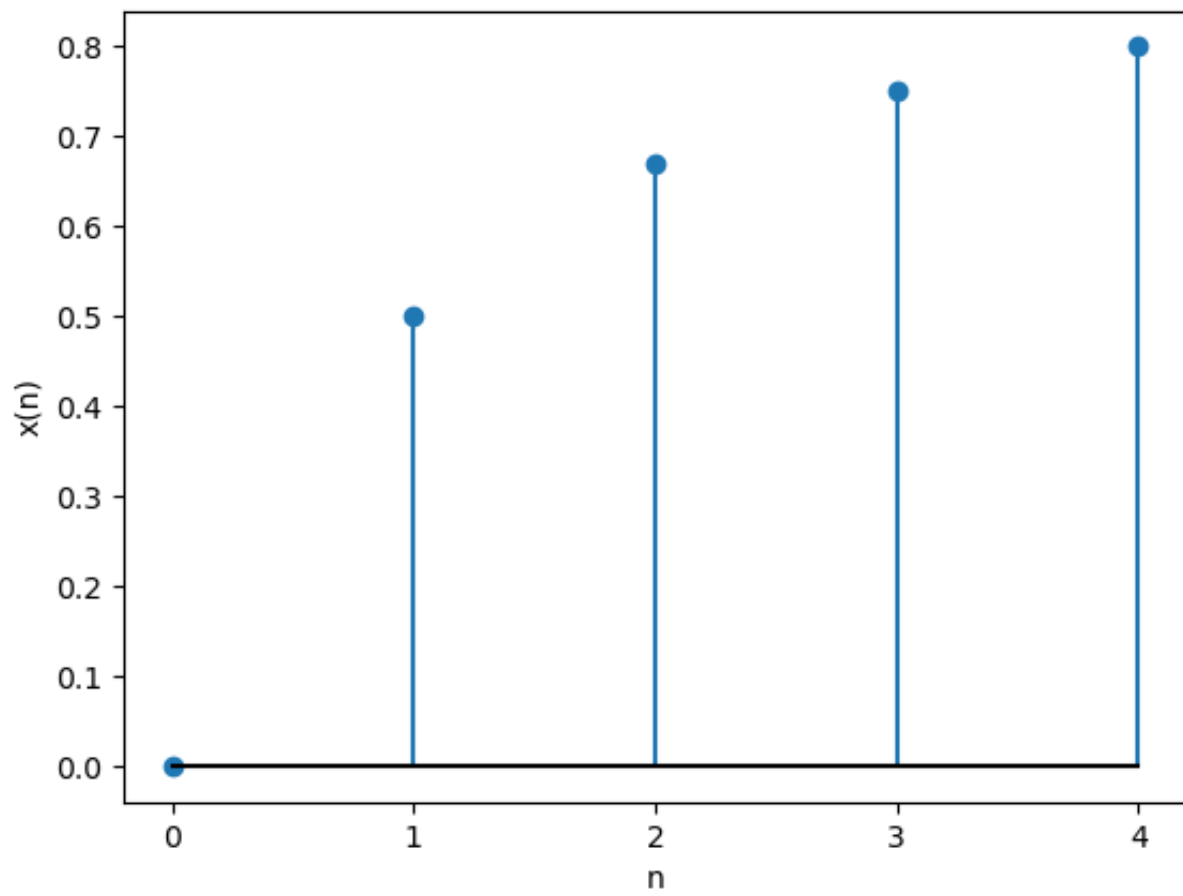


Fig. 0. Stem plot for  $x(n)$