

10.5.2.14

EE23BTECH11003 - pranav

Question: How many multiples of 4 lie between 10 and 250?

Solution:

Variable	Description	Value
$X(0)$	First term of the AP	0
d	Common difference of the AP	d
$X(n)$	General term of the AP	$4nu(n)$
$4n_1$	first multiple of 4 between 10 and 250	?
$4n_2$	last multiple of 4 between 10 and 250	?

TABLE 1: Variables Used

applying Z transform

$$X(z) = \sum_{n=-\infty}^{\infty} X(n)z^{-n} \quad (5)$$

$$\Rightarrow X(z) = \sum_{n=-\infty}^{\infty} 4nu(n)z^{-n} \quad (6)$$

$$\Rightarrow X(z) = \sum_{n=0}^{\infty} 4nz^{-n} \quad (7)$$

$$(8)$$

from ??

$$4n_1 > 10 \text{ and } 4n_2 < 250 \quad (1)$$

$$\Rightarrow n_1 = 3, n_2 = 62 \quad (\text{as } n \in \mathbb{N}) \quad (2)$$

\therefore number of multiples of 4 which lie between 10 and 250 are $62 - 3 + 1 = 60$

considering the series to start from $n = 0$ the general term

$$X(n) = [X(0) + nd]u(n) \quad (3)$$

$$X(n) = 4nu(n) \quad (4)$$

$$\Rightarrow X(z) = \frac{4z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (9)$$

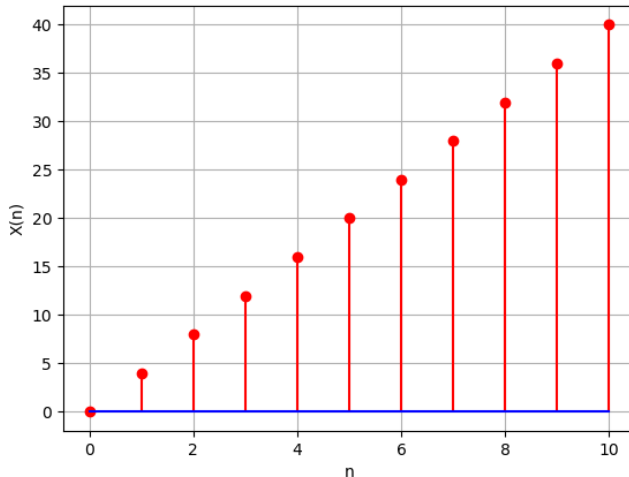


Fig. 1: stem plot of $X(n)$