

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	12
d	Common difference of the AP	4
$x(n)$	General term of the AP	$(12 + 4n)u(n)$
n	no of multiples of 4 between 10 and 250	?

TABLE 1: Variables Used

$$n = \frac{(250 - 250 \bmod 2) - (10 + 10 \bmod 2)}{4} + 1 \quad (1)$$

$$n = 60 \quad (2)$$

Considering the series to start from $n = 0$, the general term is

$$x(n) = (x(0) + nd)u(n) \quad (3)$$

$$x(n) = (12 + 4n)u(n) \quad (4)$$

applying Z transform

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

$$\Rightarrow X(z) = \sum_{n=-\infty}^{\infty} (12 + 4n)u(n)z^{-n} \quad (6)$$

$$\Rightarrow X(z) = \sum_{n=0}^{\infty} (12 + 4n)z^{-n} \quad (7)$$

$$\Rightarrow X(z) = \frac{12}{1 - z^{-1}} + \frac{4z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (8)$$

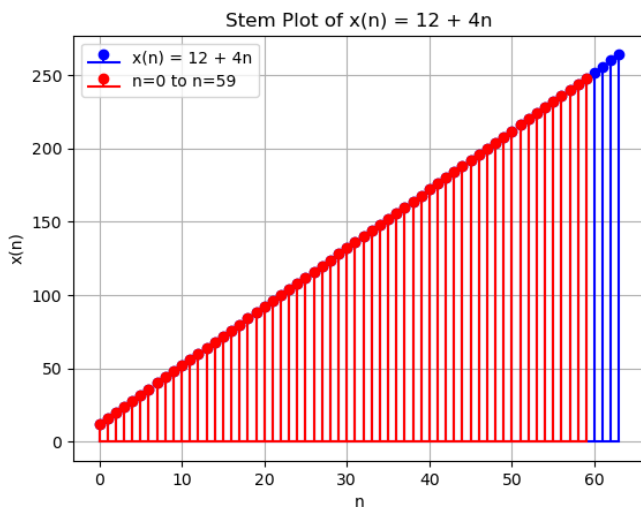


Fig. 1: stem plot of $x(n)$