10.5.2.14

EE23BTECH11003 - pranav

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

Solution: let $4n_1$ and $4n_2$ be the first and last multiples of 4 between 10 and 250 then

$$4n_1 > 10 \text{ and } 4n_2 < 250 \tag{1}$$
$$\implies n_1 > 10/4 \text{ and } n_2 < 250/4 \tag{2}$$
$$\therefore n_1 \text{ and } n_2 \in \mathbb{N} \tag{3}$$
$$\implies n_1 = 3, n_2 = 62 \tag{4}$$

$\therefore$ 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

$$X(n) = [X(0) + n \cdot d].u(n) \tag{5}$$
$$X(n) = [12 + 4 \cdot n].u(n) \tag{6}$$

applying Z transform

$$X(z) = \sum_{n=-\infty}^{\infty} X(n) \cdot z^{-n} \tag{7}$$
$$\implies X(z) = \sum_{n=-\infty}^{\infty} [12 + 4 \cdot n] \cdot u(n) \cdot z^{-n} \tag{8}$$
$$\implies X(z) = \sum_{n=0}^{\infty} [12 + 4 \cdot n] \cdot z^{-n} \tag{9}$$
$$\implies X(z) = \frac{12}{1 - z^{-1}} + \frac{4 \cdot z^{-1}}{(1 - z^{-1})^2} \tag{10}$$

Variable	Description	Value
$S(0)$	First term of the AP	12
d	Common difference of the AP	d
$S(n)$	General term of the AP	$12 + 4 \cdot n$

TABLE I: Variables Used

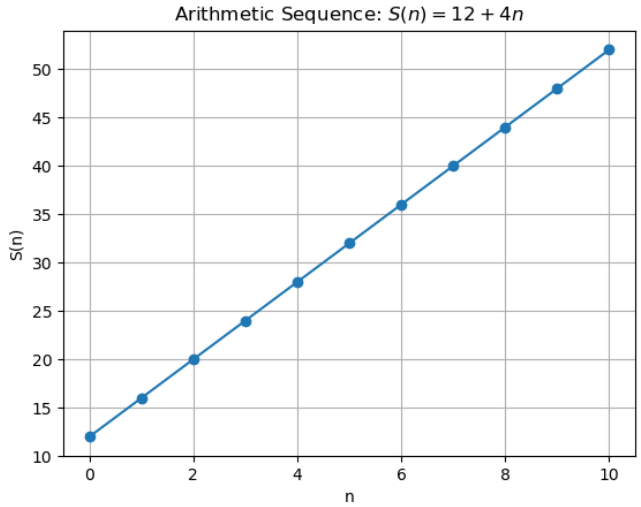

Fig. 1: general term of the AP