EE23BTECH11208 - Manohar K*

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EXERCISE 9.2

14. Insert five numbers between 8 and 26 such that the resulting sequence is an A.P. and obtain the Z-transform of the sequence.
Solution: Given,

symbol	value	description
$x(0)$	8	first term of the series
$x(6)$	26	last term of the series
N	$2 + 5 = 7$	number terms in the series

TABLE I
PARAMETERS

$$x(0) = 8, \tag{1}$$

$$x(6) = 26 \tag{2}$$

$$d = \frac{x(6) - x(0)}{N - 1}, \tag{3}$$

$$= 3 \tag{4}$$

$$x(n) = u(n)(x(0) + (n)(d)) \tag{5}$$

the A.P. sequence is:

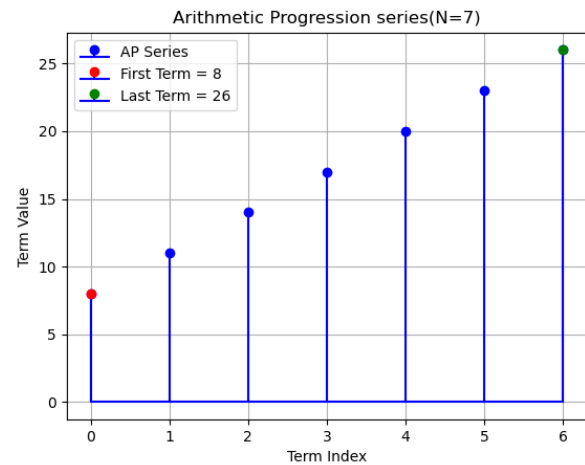$$8, 11, 14, 17, 20, 23, 26$$

Applying Z Transform:

$$X(z) = \sum_{n=-\infty}^{\infty} x(n) z^{-n} \tag{6}$$

Fig. 1. Plot of x(n) vs n

using eq (5)

$$= \sum_{n=-\infty}^{\infty} (u(n)(x(0) + n(d))) z^{-n} \tag{7}$$

using eq (**??**),

$$\implies X(z) = \frac{8}{1 - z^{-1}} + \frac{3z^{-1}}{(1 - z^{-1})^2} \tag{8}$$

$$\{z \in \mathbb{C} : z \neq 1\}$$