EE23BTECH11054 - Sai Krishna Shanigarapu*

EE23BTECH11054 - Sai Krishna Shanigarapu*

Exercise 9.2

13 If the sum of n terms of an A.P. is $3n^2 + 5n$ and its mth term is 164, find the value of m.

Solution: :

$$Y(z) = \sum_{n=0}^{\infty} y(n) z^{-n} \tag{1}$$

$$= \frac{2\left(4 - z^{-1}\right)}{\left(1 - z^{-1}\right)^3} \qquad \{z \in \mathbb{C} : |z| > 1\} \tag{2}$$

$$U(z) = \frac{1}{1 - z^{-1}} \qquad \{z \in \mathbb{C} : |z| > 1\} \tag{3}$$

$$X(z) = \frac{Y(z)}{U(z)} \tag{4}$$

$$x(n) = Z_z^{-1}\left[2\left(\frac{1}{1 - z^{-1}}\right) + 6\left(\frac{1}{1 - z^{-1}}\right)^2\right] \tag{5}$$

$$= (6n + 8)(u(n)) \tag{6}$$

$$164 = (6m + 8)(u(n)) \tag{7}$$

$$\therefore m = 26$$

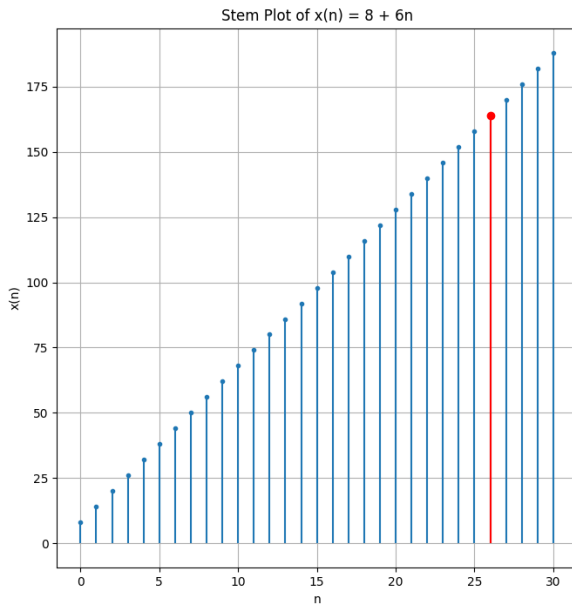| Symbol	Remarks
$y(n) = \left(3n^2 + 11n + 8\right)(u(n))$	Sum of n terms
$x(m - 1)$	164
$y(n)$	$x(n) * u(n)$
$Z_z^{-1}\left(\frac{1}{1-z^{-1}}\right)$	$u(n)$
$Z_z^{-1}\left(\frac{1}{1-z^{-1}}\right)^2$	$(n+1)(u(n))$

TABLE I
Parameters

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