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: :

$$Y(z) = \frac{2z^2(4z-1)}{(z-1)^3} \qquad \{z \in \mathbb{C} : |z| > 0\} \tag{1}$$

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

$$X(z) = \frac{Y(z)}{U(z)} \tag{3}$$

$$x(n) = Z_z^{-1}\left[2\left(\frac{z}{z-1}\right) + 6\left(\frac{z}{z-1}\right)^2\right] \tag{4}$$

$$= (6n+8)(u(n)) \tag{5}$$

Symbol	Formulae
$y(n)$	$x(n) * u(n)$
$Z_z^{-1}\left(\frac{z}{z-1}\right)$	$u(n)$
$Z_z^{-1}\left(\frac{z}{z-1}\right)^2$	$(n+1)(u(n))$

TABLE I
Formulae

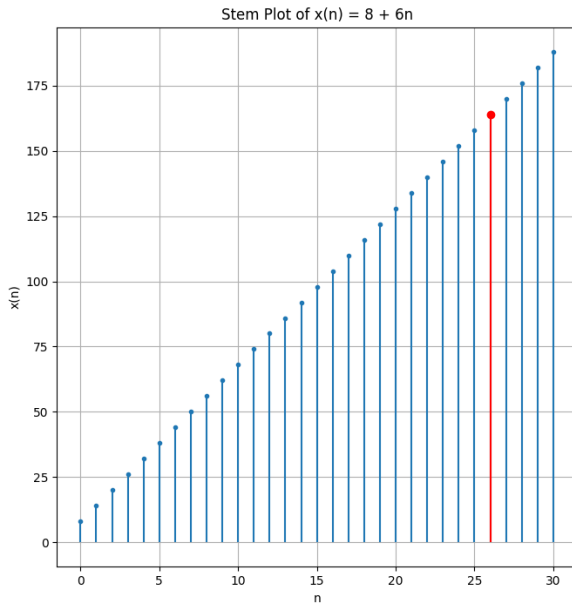| Symbol	Parameters
$y(n) = \left(3(n+1)^2 + 5(n+1)\right)(u(n))$	Sum of n terms
$x(n)$	general term
$u(n)$	unit step function
$Y(z)$	Z-transform of $y(n)$
$X(z)$	Z-transform of $x(n)$
$U(z)$	Z-transform of $u(n)$

TABLE II
Parameters

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

$$\therefore m = 26$$