NCERT DISCRETE

EE23BTECH11020 - Raghava Ganji*

Question 10.5.3.5: The first term of an AP is 5, the last term is 45 and the sum is 400. Find the number of terms and the common difference.

solution:

Given AP is 5, . . . , 45.

$x(0)$	5	1st term
$x(n-1)$	45	nth term
$y(n-1)$	400	sum of n terms
n	?	no.of terms
d	?	common difference

TABLE 0
PARAMETERS

$$x(n) = x(0) + nd \tag{1}$$

$$40 = (n-1)\,d \tag{2}$$

$$y(n) = \frac{n+1}{2}\left[2x(0) + nd\right] \tag{3}$$

$$y(n-1) = \frac{n}{2}\left[2x(0) + (n-1)\,d\right] \tag{4}$$

$$\implies n = 16 \tag{5}$$

$$\implies d = \frac{8}{3} \tag{6}$$

by substituting the value of n in the equation 2, we get the equation 6.

z transform of $x(n), y(n)$ are $X(z), Y(z)$

$$X(z) = \frac{7}{3(1-z^{-1})} + \frac{8}{3(1-z^{-1})^2} \tag{7}$$

$$Y(z) = \frac{7}{3(1-z^{-1})^2} + \frac{8}{3(1-z^{-1})^3} \tag{8}$$

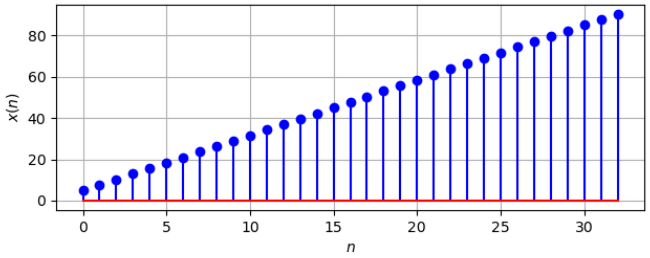

Fig. 0. figure:1