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
$x(n)$	45	$(n+1)$th term
$y(n)$	400	sum of $(n+1)$ terms
n+1	?	no.of terms
d	?	common difference

TABLE 0
PARAMETERS

$$x(n) = x(0) + nd$$
$$40 = nd \tag{1}$$
$$y(n) = \frac{n+1}{2}\left[2x(0) + nd\right]$$
$$\implies n = 15 \tag{2}$$
$$\implies d = \frac{8}{3} \tag{3}$$

by substituting equation (2) in the equation (1), we get the equation (3).

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

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

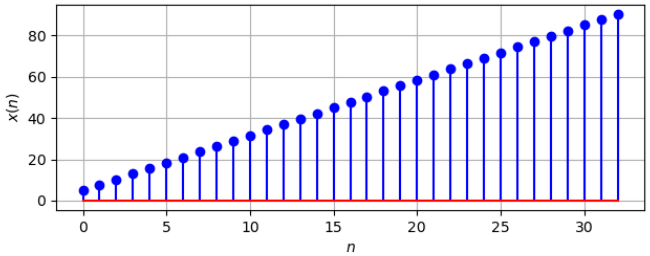

Fig. 0. analysis of x(n)

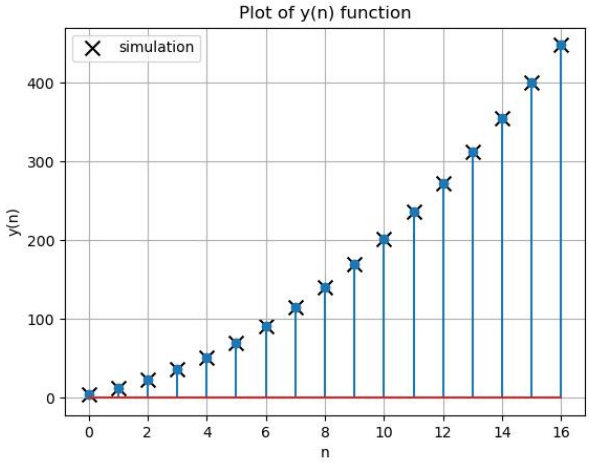

Fig. 0. simulation vs analysis of y(n)