

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

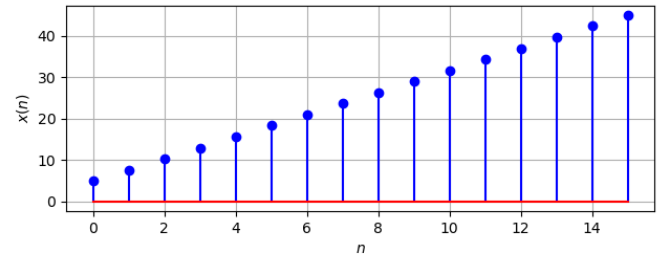


Fig. 0. analysis of $x(n)$

$$x(n) = x(0) + nd \quad (1)$$

$$40 = nd \quad (2)$$

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

$$\Rightarrow n = 15 \quad (4)$$

$$\Rightarrow d = \frac{8}{3} \quad (5)$$

by substituting equation (4) in the equation (2), we get the equation (5).

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

$$X(z) = \frac{7}{3(1-z^{-1})} + \frac{8}{3(1-z^{-1})^2} \quad (6)$$

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

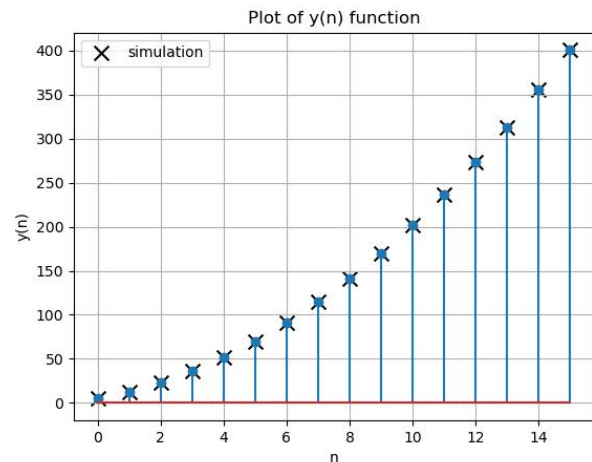


Fig. 0. simulation vs analysis of $y(n)$