NCERT Discrete - 11.5.9.2

EE23BTECH11201 - Abburi Tanusha[*]

Question: The sum of three numbers in an arithmetic progression (AP) is 24 and the product of those three numbers is 440, find the values of the three numbers.

Solution: The following information is provided in the question:

Parameter	Value	Description
$x(n)$	$(x(0) + n \cdot d)\, u(n)$	$(n+1)$th term
$y(2)$	24	sum of the terms
$x(0) \cdot x(1) \cdot x(2)$	440	product of terms

TABLE 0

PARAMETERS

Let the three numbers in the arithmetic progression be denoted as $x(0)$, $x(1)$, and $x(2)$.

From Table 0

$$y(2) = x(0) + x(1) + x(2) \tag{1}$$
$$= (x(1) - d) + x(1) + (x(1) + d) \tag{2}$$
$$\implies 3x(1) = 24 \tag{3}$$
$$x(1) = 8 \tag{4}$$
$$x(0) \cdot x(1) \cdot x(2) = 440 \tag{5}$$
$$(8 - d) \cdot (8) \cdot (8 + d) = 440 \tag{6}$$
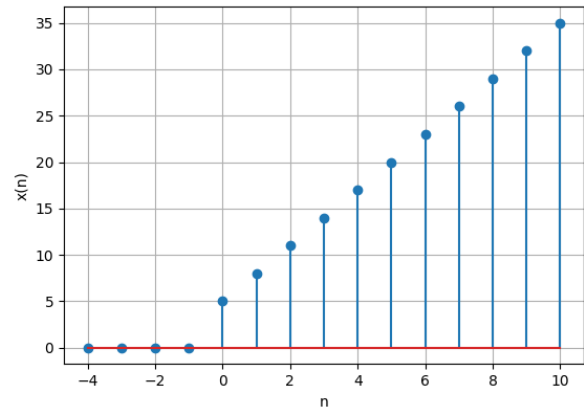$$\implies d = 3 \tag{7}$$
$$x(0) = x(1) - d \tag{8}$$
$$\implies x(0) = 5 \tag{9}$$
$$x(n) = (5 + 3n)\, u(n) \tag{10}$$

Fig. 0. stem plots of x(n)

From equation (**??**)

$$\implies X(z) = \frac{5 - 8z^{-1}}{(1 - z^{-1})^2}; \quad |z| > |1| \tag{11}$$

Therefore, the required three numbers in AP are 5, 8, and 11.