NCERT Discrete - 11.5.9.2

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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
d	3	common difference
x(n)	$(x(0)+n\times d)$ u(n)	(n+1)th term
S(n)	24	sum of (n+1) terms
p(n)	440	product of (n+1) terms

TABLE 0
PARAMETERS

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

$$S(2) = x(0) + x(1) + x(2) \tag{1}$$

$$= (x(1) - d) + x(1) + (x(1) + d) \tag{2}$$

$$S(2) = 3x(1) = 24 \tag{3}$$

$$x(1) = 8 \tag{4}$$

$$p(2) = x(0) \times x(1) \times x(2) \tag{5}$$

$$(8) \times (8 - d) \times (8 + d) = 440 \tag{6}$$

$$(8 - d) \times (8 + d) = 55 \tag{7}$$

$$d = 3 \tag{8}$$

$$x(0) = x(1) - d \tag{9}$$

$$x(n) = (x(0) + n \times d)\, u(n) \tag{10}$$

$$= (5 + 3n)\, u(n) \tag{11}$$

$$From \quad (??) \tag{12}$$

$$X(z) = \frac{5 - 8z^{-1}}{(1 - z^{-1})^2}; \quad |z| > |1| \tag{13}$$

Therefore, The required three numbers in AP is 5,8 and 11.

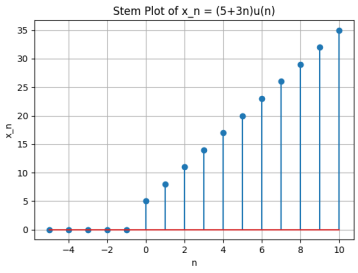

Fig. 0. stem plots of x(n)