

NCERT Discrete

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EE23BTECH11050

Question 10.5.2.8:

An AP consists of 50 terms of which 3rd term is 12 and the last term is 106. Find the 29th term.

Solution:

Parameter	Value	description
$x(2)$	12	Third term
$x(49)$	106	Last term
$x(0)$		First term
d		Common difference
$x(n)$	$[x(0) + nd]u(n)$	general term

TABLE I
INPUT PARAMETERS

$$x(2) = x(0) + 2d \quad (1)$$

$$x(49) = x(0) + 49d \quad (2)$$

By solving (1) and (2), we get

$$\Rightarrow d = 2 \quad (3)$$

$$\Rightarrow x(0) = 8 \quad (4)$$

From the table

$$x(n) = [x(0) + nd]u(n) \quad (5)$$

$$\Rightarrow x(n) = (8 + 2n)u(n) \quad (6)$$

Finding $x(29)$

$$x(28) = x(0) + 28(2) \quad (7)$$

$$\Rightarrow x(28) = 64 \quad (8)$$

Finding the Z-transform

$$X(z) = \sum_{k=-\infty}^{\infty} x(n) \times u(n) \times z^{-n} \quad (9)$$

$$= \sum_{k=0}^{\infty} x(n) \times z^{-n} \quad (10)$$

$$\Rightarrow X(z) = \frac{8 - 6z^{-1}}{(1 - z^{-1})^2} \quad \text{ROC} \rightarrow (|z| > 1) \quad (11)$$

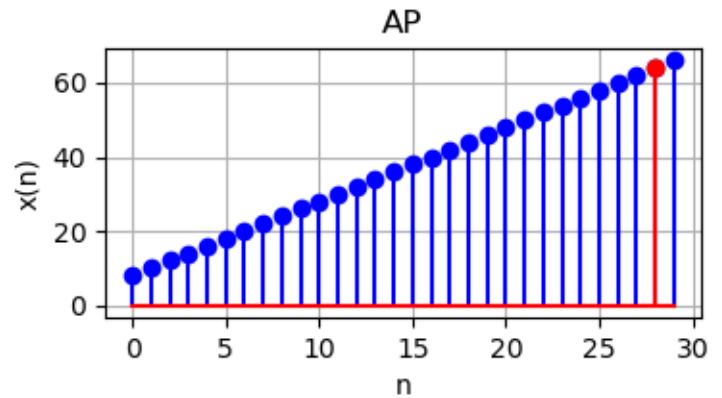


Fig. 1. graph of the given AP