NCERT Discrete

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EE23BTECH11050

Question 10.5.2.8:
An AP consists of 50 terms of which 3^{rd} term is 12 and the last term is 106. Find the 29^{th} 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

$$x(2) = x(0) + 2d \tag{1}$$
$$x(49) = x(0) + 49d \tag{2}$$

1) By solving (1) and (2) :

$$\implies d = 2 \tag{3}$$
$$\implies x(0) = 8 \tag{4}$$

2) From the Table I :

$$x(n) = (x(0) + nd)u(n) \tag{5}$$
$$\implies x(n) = (8 + 2n)u(n) \tag{6}$$

3) Finding $x(28)$:

$$x(28) = x(0) + 28(2) \tag{7}$$
$$\implies x(28) = 64 \tag{8}$$

4) Finding the Z-transform :

$$X(z) = \sum_{k=-\infty}^{\infty} x(n)u(n)z^{-n} \tag{9}$$
$$= \sum_{k=0}^{\infty} x(n)z^{-n} \tag{10}$$
$$\implies X(z) = \frac{8 - 6z^{-1}}{(1 - z^{-1})^2} \quad \text{ROC} \rightarrow (|z| > 1) \tag{11}$$

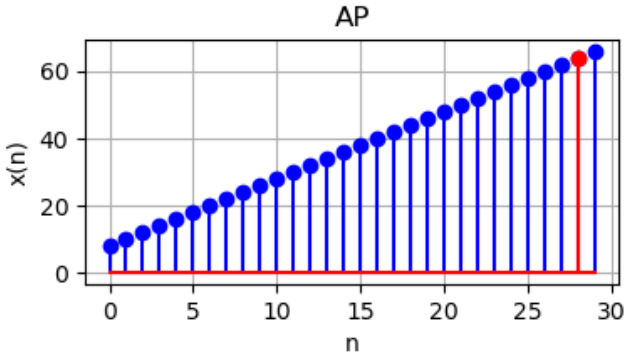

Fig. 1. graph of the given AP