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

$$\begin{bmatrix} x(2) \\ x(49) \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 1 & 49 \end{bmatrix} \begin{bmatrix} x(0) \\ d \end{bmatrix} \tag{1}$$

1) On solving (1) we get,

$$\implies d = 2 \tag{2}$$

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

2) From the Table I :

$$x(n) = (x(0)+nd)u(n) \tag{4}$$

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

3) Finding $x(28)$:

$$x(28) = x(0) + 28(2) \tag{6}$$

$$\implies x(28) = 64 \tag{7}$$
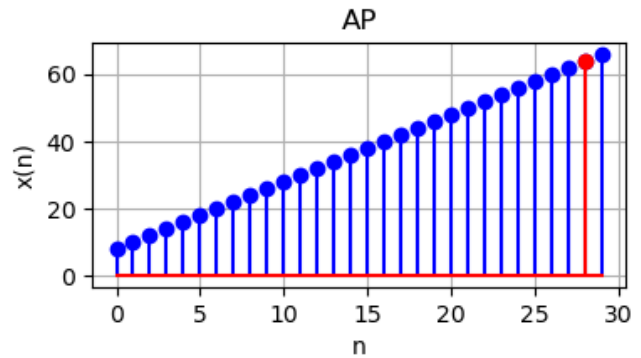
4) Z-transform :

$$\implies X(z) = \frac{8 - 6z^{-1}}{(1-z^{-1})^2} \quad |z| > 1 \tag{8}$$

Fig. 1. graph of the given AP