

## 10.5.2.7

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**Question:** Find the 31st term of an AP whose 11th term is 38 and the 16th term is 73.

**Solution:**

TABLE 0  
GIVEN VALUES

Symbol	Value	Description
$x(0)$	-32	First term
$x(10)$	38	11th term
$x(15)$	73	16th term
$d$	7	Common Difference
$x(n)$	?	$(n + 1)$ th term

From Table

$$x(0) + 10d = 38 \quad (1)$$

$$x(0) + 15d = 73 \quad (2)$$

From equations 1 and 2, the augmented matrix is:

$$\begin{pmatrix} 1 & 10 & 38 \\ 1 & 15 & 73 \end{pmatrix} \xrightarrow{R_2 \rightarrow R_2 - R_1} \begin{pmatrix} 1 & 10 & 38 \\ 0 & 5 & 35 \end{pmatrix} \quad (3)$$

$$\xrightarrow{R_1 \rightarrow R_1 - 2R_2} \begin{pmatrix} 1 & 0 & -32 \\ 0 & 5 & 35 \end{pmatrix} \quad (4)$$

$$\xrightarrow{R_2 \rightarrow \frac{R_2}{5}} \begin{pmatrix} 1 & 0 & -32 \\ 0 & 1 & 7 \end{pmatrix} \quad (5)$$

$$\Rightarrow \begin{pmatrix} x(0) \\ d \end{pmatrix} = \begin{pmatrix} -32 \\ 7 \end{pmatrix} \quad (6)$$

The general term and the Z-transform are given by

$$x(n) = (-32 + 7n) u(n) \quad (7)$$

$$(8)$$

The 31st term of this A.P. is

$$x(30) = 178 \quad (9)$$

From (??), the Z-Transform of  $x(n)$  is given by

$$X(z) = \frac{-32}{1 - z^{-1}} + \frac{7z^{-1}}{(1 - z^{-1})^2} \quad (10)$$

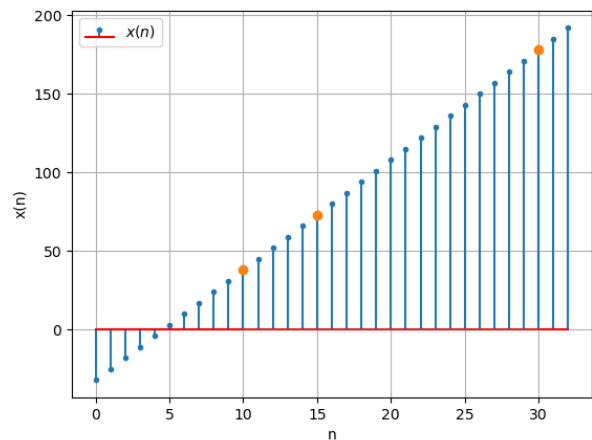


Fig. 0. Stem plot of  $x(n)$  v/s  $n$