

NCERT DISCRETE

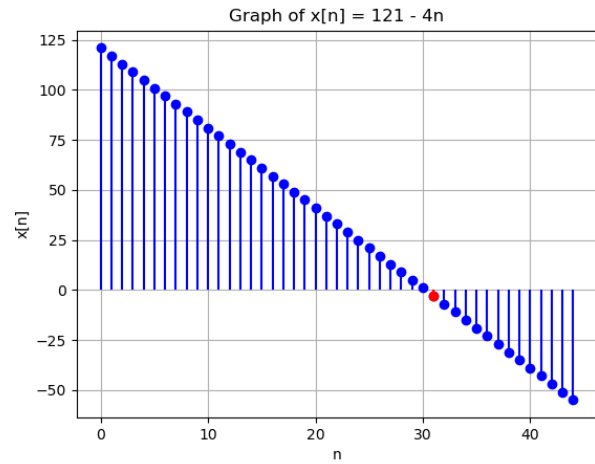
EE23BTECH11214 - Harsha Vardhan Paramata*

Question 10.5.4.1: Which term of the AP: 121, 117, 113, ..., is its first negative term?

Solution:

Symbol	Description	Value
$x[n]$	General term	$121 - 4n$
$x[z]$	Initial term	121
d	Common difference	4

TABLE 0
PARAMETERS LIST



$$x[n] = 121 - 4n < 0 \quad (1)$$

$$n > \frac{121}{4} \quad (2)$$

The first negative term in the sequence occurs at $n = 31$ Z-transform of this sequence:

$$X(z) = \sum_{n=0}^{\infty} x[n] z^{-n} \quad (3)$$

$$= \sum_{n=0}^{\infty} (121 - 4n) z^{-n} \quad (4)$$

$$X(z) = \frac{z(121z - 125)}{(z - 1)^2}, \quad |z| > 1 \quad (5)$$