NCERT DISCRETE 10.5.4 Q1

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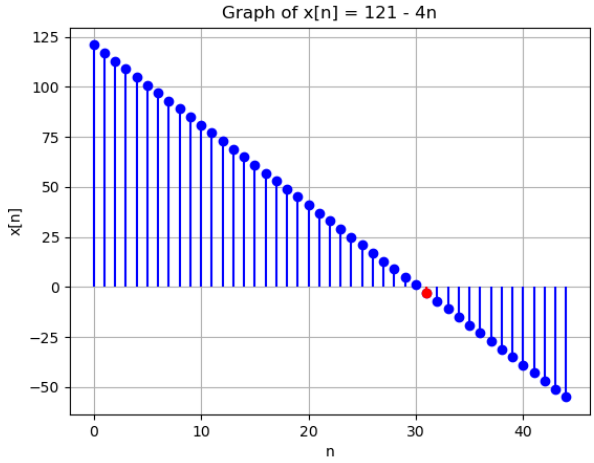
Question: Which term of the AP: 121, 117, 113, . . . , is its first negative term?

Solution:

Symbol	Description	Value
$x[n]$	General term	$121-4n$
$x[0]$	Initial term	121
d	Common difference	4

TABLE I
PARAMETERS LIST



$$x[n] = 121 - 4n < 0 \tag{1}$$

$$n > \frac{121}{4} \tag{2}$$

the first negative term in the sequence occurs at

$$n = 31$$

z-transform of this sequence

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

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

$$X(z) = \frac{z(121z - 125)}{(z-1)^2} \tag{5}$$

The pole is at $z = 1$.