

NCERT DISCRETE 11.9.5 Q9

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Question:

The first term of a G.P. is 1. The sum of the third term and fifth term is 90. Find the common ratio of G.P.

Solution:

G.P. in terms of its z-transform:

Symbol	Description	Value
$x(n)$	General term	ar^n
a	First term	1
r	Common ratio	-
$x(2) + x(4)$	Sum of 3rd and 5th terms	90

TABLE I
GIVEN PARAMETERS LIST

$$ar^2 + ar^4 = 90 \quad (1)$$

$$r^2 + r^4 = 90 \quad (2)$$

$$(r^2 - 9)(r^2 + 10) = 0 \quad (3)$$

$$r^2 = 9 \quad (4)$$

$$r = \pm 3 \quad (5)$$

z transform of GP is

Referred from appendix (??)

For $r = 3$

$$X(z) = \frac{1}{1 - 3z^{-1}}, \quad |z| > |3| \quad (6)$$

For $r = -3$

$$X(z) = \frac{1}{1 + 3z^{-1}}, \quad |z| > |3| \quad (7)$$

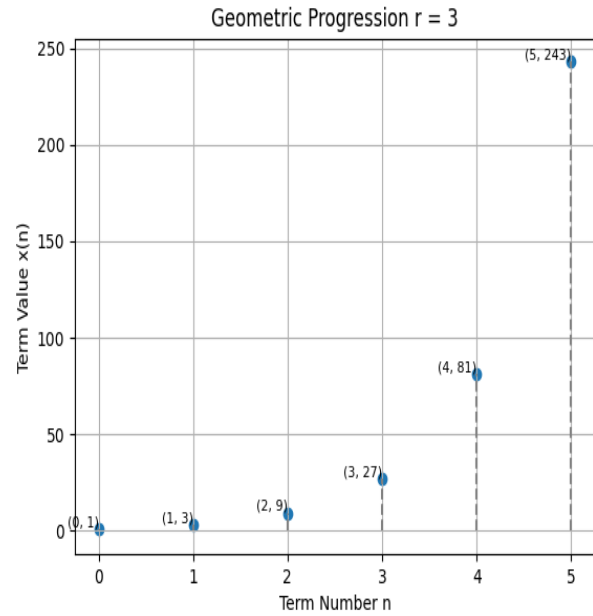


Fig. 1.

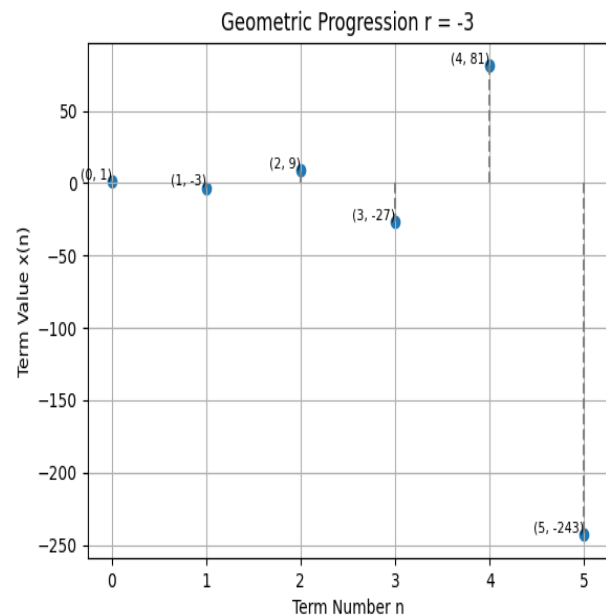


Fig. 2.