

DISCRETE 11.9.3 Q-4

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Question:

The 4th term of a G.P. is square of its second term, and the first term is -3. Determine its 7th term, and find the Z transform of the series.

Solution:

Variable	Description	value
$x(0)$	first term of G.P.	-3
r	Common ratio of G.P.	-3
$x(n)$	general term of the G.P.	ar^n
$x(3)$	fourth term	$x(1)^2$
$u(n)$	unit step function	-

TABLE I

A TABLE WITH INPUT PARAMETERS

$$x(0)r^3 = (x(0)r^1)^2 \quad (1)$$

$$\Rightarrow x(0)r^3 = x(0)^2 r^2 \quad (2)$$

$$\Rightarrow r = x(0) \quad (3)$$

$$\Rightarrow r = -3 \quad (4)$$

general term

$$x(n) = x(0)r^n u(n) \quad (5)$$

$$= (-3)(-3)^n u(n) \quad (6)$$

The 7th term of the sequence will be:

$$x(6) = (-3)(-3)^6 \quad (7)$$

$$= -2187 \quad (8)$$

Z transform of the given G.P is:
 $X(z) = \frac{a}{1-rz^{-1}} = \frac{-3}{1+3z^{-1}} \cdot \{ROC : |rz^{-1}| < 1\}$

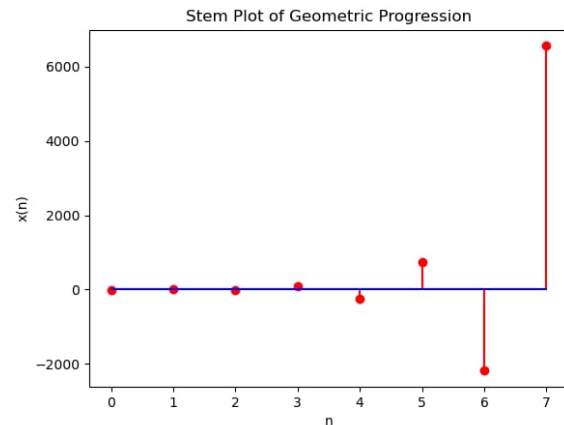


Fig. 1. Graph showing first 8 terms of the GP