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. **Solution:**

Variable	Description	value
$x(0)$	first term of G.P.	-3
r	Common ratio of G.P.	?
$x(n)$	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

$$x(0)\, r^3 = \left(x(0)\, r^1 \right)^2 \qquad (1)$$

$$= x(0)^2\, r^2 \qquad (2)$$

$$\implies r = x(0) \qquad (3)$$

$$= -3 \qquad (4)$$

general term

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

$$= (-3)^{n+1}\, u(n) \qquad (6)$$

The 7th term of the sequence will be:

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

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

Z transform of the given G.P is:

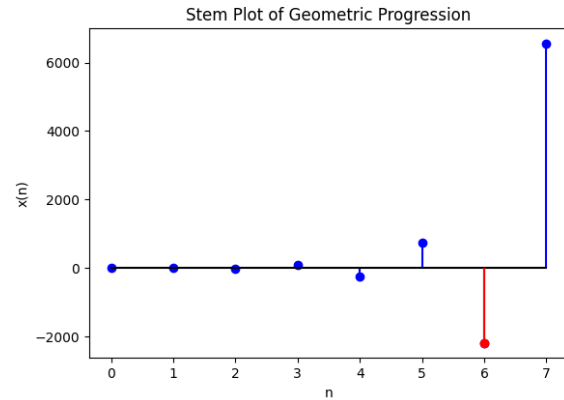$$X(z) = \frac{a}{1 - rz^{-1}} = \frac{-3}{1 + 3z^{-1}}. \quad |z| > 3 \qquad (9)$$

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