DISCRETE 11.9.3 Q-4

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Question:

The 4^{th} term of a G.P. is square of its second term, and the first term is -3. Determine its 7^{th} term. **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

$$x(0)\,r^3 = \left(x(0)\,r^1\right)^2 \tag{1}$$
$$\implies x(0)\,r^3 = x(0)^2\,r^2 \tag{2}$$
$$\implies r = x(0) \tag{3}$$
$$\implies r = -3 \tag{4}$$

general term

$$x(n) = x(0)\,r^n u(n) \tag{5}$$
$$= (-3)^{n+1}\,u(n) \tag{6}$$

The 7^{th} term of the sequence will be:

$$x(6) = (-3)(-3)^6 \tag{7}$$
$$= -2187 \tag{8}$$

Z transform of the given G.P is:

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

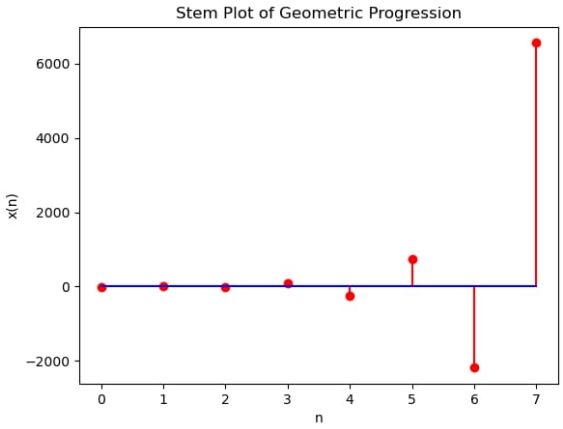

Fig. 1. Graph showing first 8 terms of the GP