# 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. | ? |
| $x(n)$ | 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

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

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:

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

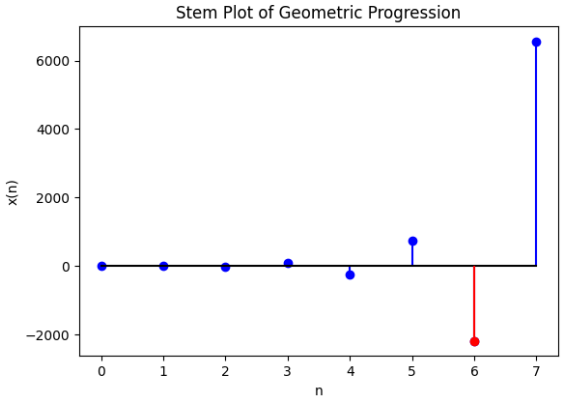


Fig. 1. Graph showing first 8 terms of the GP