NCERT: 11.9.3.2

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QUESTION:

Find the 12^{th} term of a G.P. whose 8^{th} term is 192 and common ratio is 2.

SOLUTION:

Variable	Description	value
r	common ratio	2
$x(7)$	eighth term	192
$x(n)$	General term of sequence	None
$X(z)$	Z-Transform Equation	None

TABLE 1
VARIABLES USED AND THEIR DESCRIPTIONS

General term can be written as

$$x(n) = x(0)\, r^n u(n) \tag{1}$$

Now on Z-transforming, we get

$$X(z) = \frac{x(0)}{1 - rz^{-1}} \quad \forall \quad |z| > |r| \tag{2}$$

Referring to Table **??**

$$x(7) = 192 \tag{3}$$

$$\implies x(0)\, 2^7 = 192 \tag{4}$$

$$\implies x(0) = \frac{3}{2} \tag{5}$$

The general term is written as

$$x(n) = \frac{3}{2} \times 2^n u(n) \tag{6}$$

From (2) and Table 1, we get

$$\boxed{X(z) = \frac{3}{1 - 2z^{-1}}} \quad \forall \quad |z| > 2 \tag{7}$$

From Table 1

$$x(11) = 1.5 \times 2^{11} = 3072 \tag{8}$$

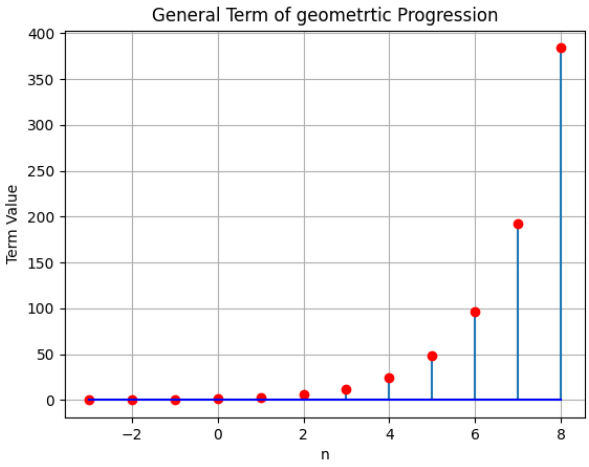

Fig. 1. Plot of the general term taken from Python3