

# Assignment

EE23BTECH11001 - Aashna Sahu

Q: Find a GP for which sum of the first two terms is -4 and the fifth term is 4 times the third term.

**Solution:** Let the GP be  $a_0, a_0r, a_0r^2, a_0r^3, \dots, a_0r^n$

$$x(n) = x(0)r^n$$

Given:

$$x(0) + x(0)r = -4 \quad (1)$$

$$x(0)r^4 = 4 * x(0)r^2 \quad (2)$$

On solving eq(2)

$$r = +2, -2 \quad (3)$$

Substituting value of r in eq(1)

For  $r = +2$

$$x(0) = \frac{-4}{3}$$

GP:  $\frac{-4}{3}, \frac{-8}{3}, \frac{-16}{3}, \dots$

For  $r = -2$

$$x(0) = 4$$

GP: 4, -8, 16, -32, ....

General term can also be written as

$$x(n) = x(0) \times r^n u(n) \quad (4)$$

$$X(z) = \sum_{n=-\infty}^{\infty} x(0)r^n z^{-n} u(n) \quad (5)$$

$$X(z) = \frac{x(0)}{1 - rz^{-1}} \quad \text{ROC: } |rz^{-1}| < 1 \quad (6)$$

$$X(z) = \begin{cases} \frac{4}{3(2z^{-1} - 1)}, & r = +2 \\ \frac{4}{1 + 2z^{-1}}, & r = -2 \end{cases}$$

Variable	Description	Value( $GP_1$ )	Value( $GP_2$ )
$x(0)$	First term of AP	-4/3	4
$d$	Common difference	+2	-2
$x(n)$	General term of given AP	$\frac{-4}{3} \times (2^n)$	$4 \times (-2)^n$

TABLE 0: Input parameters

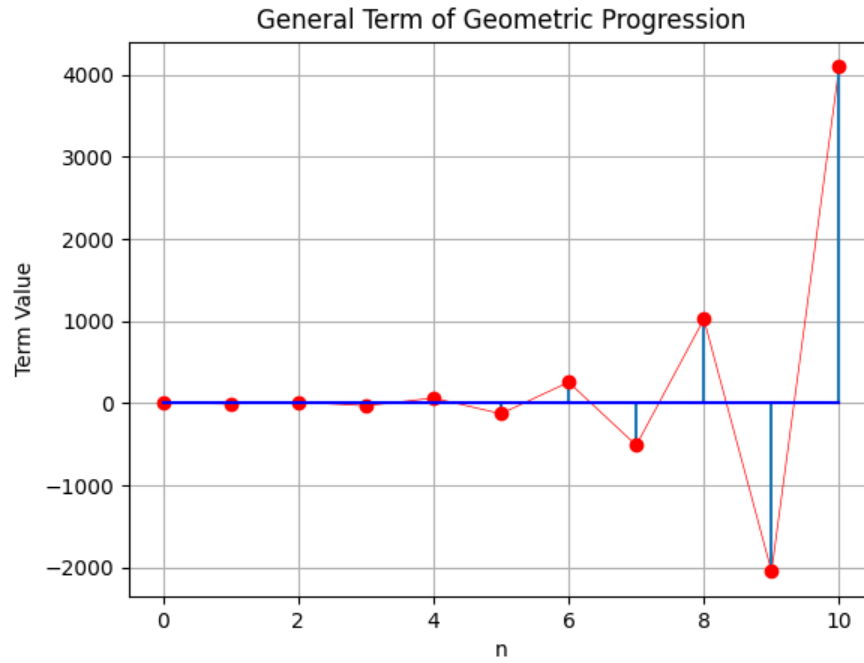


Fig. 0: Representation of  $x(n)$  in  $GP_2$

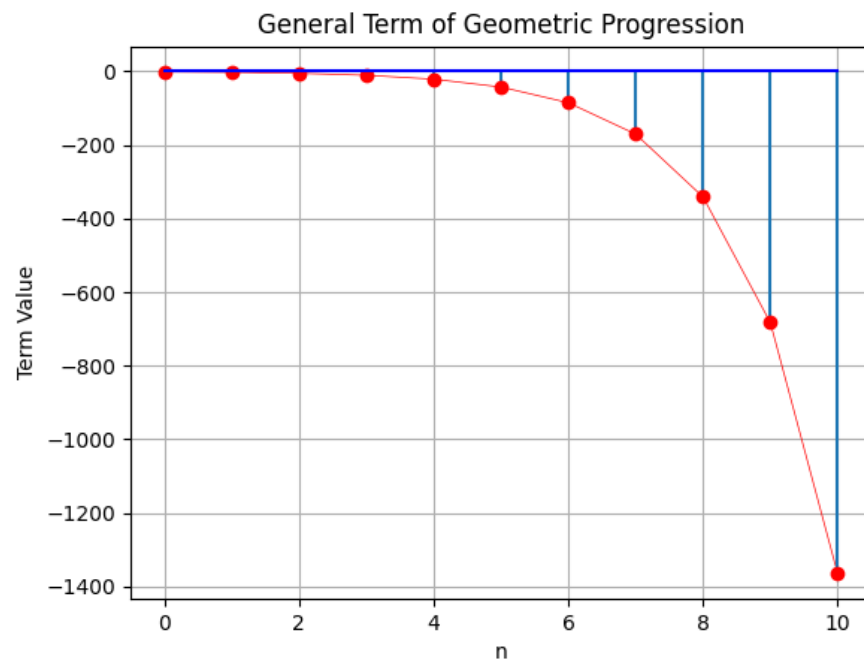


Fig. 0: Representation of  $x(n)$  in  $GP_1$