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:

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

Parameter	Description	Value
$x(0)$	First term of AP	–
r	Common ratio	–
$x(n)$	General term of given AP	–
$x(0) + x(1)$	sum of 1st and 2nd term	-4
$\frac{x(4)}{x(2)}$	Ratio of 5th and 3rd term	4

TABLE 0: Input Parameters

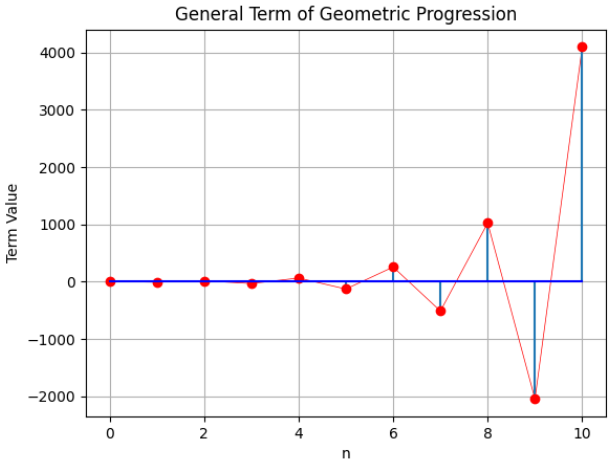

Fig. 0: Representation of x(n) in GP_2

$$x(0)r^4 = 4x(0)r^2 \tag{1}$$

$$r = +2, -2 \tag{2}$$

From Table 0 and eq.(2) :

For $r = +2$
$x(0) = \frac{-4}{3}$

$x(n) = \frac{-4}{3} \times (2^n)$

GP_1: $\frac{-4}{3}, \frac{-8}{3}, \frac{-16}{3}, ...$

For $r = -2$
$x(0) = 4$

$x(n) = 4 \times (-2)^n$

GP_2:$4, -8, 16, -32, ...$

General term can also be written as

$$\boxed{x(n) = x(0) \times r^n u(n)} \tag{3}$$

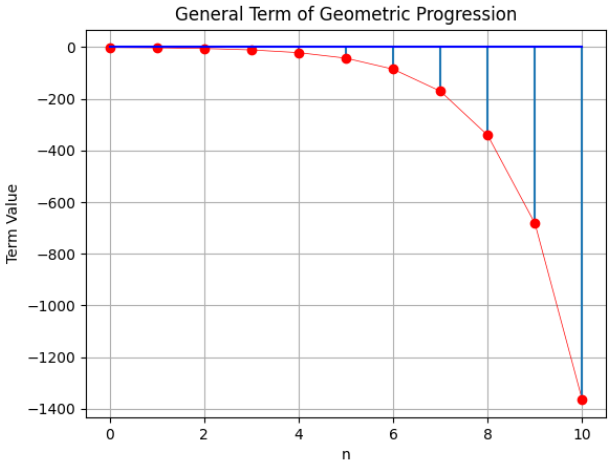

Fig. 0: Representation of x(n) in GP_1

$$X(z) = \frac{x(0)}{1 - rz^{-1}} \quad \text{ROC:}|z| > |r| \tag{4}$$

$$X(z) = \begin{cases} \dfrac{4}{3(2z^{-1} - 1)}, & r = +2 \\ \dfrac{4}{1 + 2z^{-1}}, & r = -2 \end{cases} \tag{5}$$

ROC: $z \in (-\infty, -2) \cup (2, \infty)$