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:

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
$y(n)$	Sum of first n+1 terms	$x(0)\left(\frac{r^n-1}{r-1}\right)u(n)$

TABLE 0: Input Parameters

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

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

$$\implies r = +2, -2 \tag{3}$$

From Table 0 and (3) :

$$y(1) = x(0)\left(\frac{r^2-1}{r-1}\right)u(1) \tag{4}$$

$$-4 = x(0)(r+1) \tag{5}$$

$$\implies x(0) = \frac{-4}{r+1} \tag{6}$$

$$x(0) = \begin{cases} \frac{-4}{3}, & r = +2 \\ 4, & r = -2 \end{cases} \tag{7}$$

$$X(z) = \frac{x(0)}{1 - rz^{-1}} \quad \text{ROC: } |z| > |r| \tag{8}$$

$$X(z) = \begin{cases} \frac{4}{3(2z^{-1}-1)}, & r = +2 \\ \frac{4}{1+2z^{-1}}, & r = -2 \end{cases} \tag{9}$$

ROC: $|z| > 2$

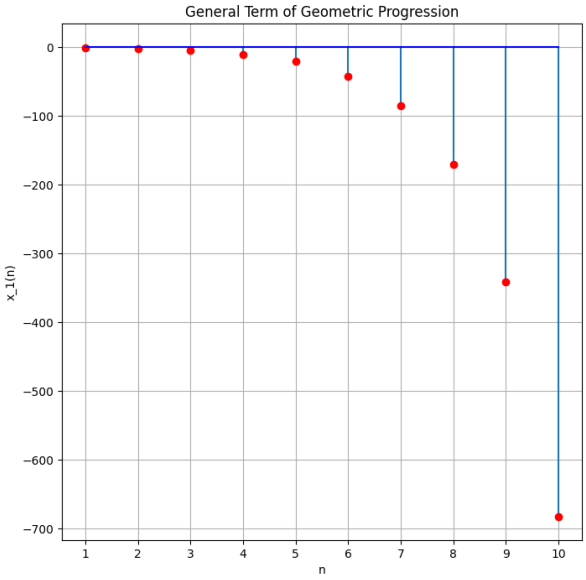

Fig. 0: Representation of x(n) in GP_2

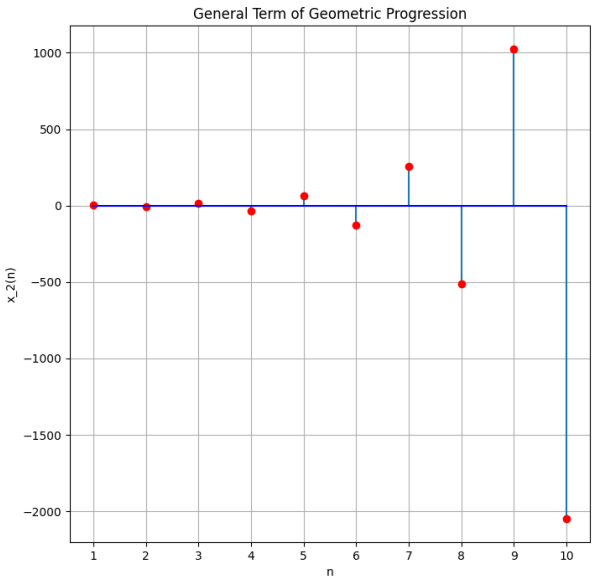

Fig. 0: Representation of x(n) in GP_1