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	$x(0)r^n u(n)$
$x(0)+x(1)$	sum of 1st and 2nd term	-4
$\frac{x(4)}{x(2)}$	Ratio of 5th and 3rd term	4

TABLE 0: Input Parameters

From Table 0:

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

$$\implies r = \pm 2 \tag{2}$$

From Table 0 and (2) :

$$x(0)r + x(0) = -4 \tag{3}$$

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

$$x(0) = \begin{cases} \frac{-4}{3}, & r = +2 \\ 4, & r = -2 \end{cases} \tag{5}$$

$$X(z) = \frac{x(0)}{1 - rz^{-1}} \quad , |z| > |r| \tag{6}$$

$$X(z) = \begin{cases} \frac{4}{3(2z^{-1}-1)}, & r = +2 \\ \frac{4}{1+2z^{-1}}, & r = -2 \end{cases} \tag{7}$$

$$|z| > 2$$

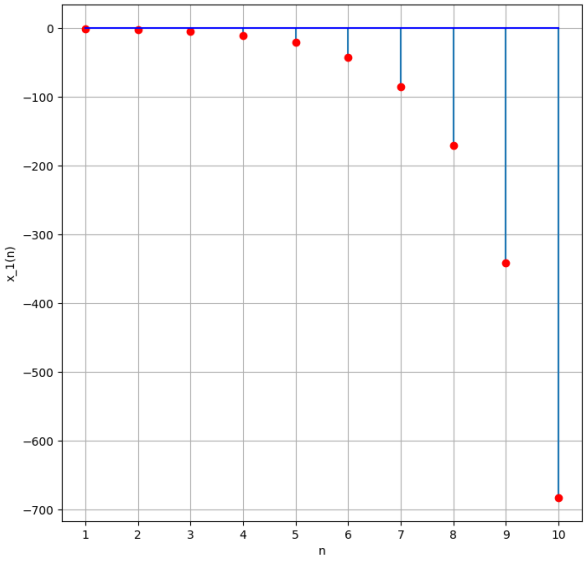

Fig. 0: Representation of x(n) for $r = 2$

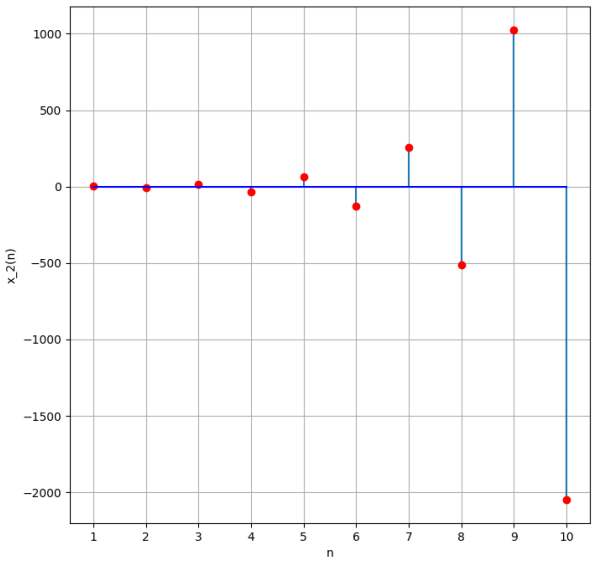

Fig. 0: Representation of x(n) for $r = -2$