11.9.3.6

EE23BTECH11022 - G DILIP REDDY

Question:
For what values of x, the numbers $-\frac{2}{7}, x, -\frac{7}{2}$ are in G.P ?

Solution:
Let r be the common ratio

$$\text{From Table 1:} \implies \frac{x}{\left(-\frac{2}{7}\right)} = \frac{\left(-\frac{7}{2}\right)}{x} = r \quad (1)$$

$$x^2 = \left(-\frac{2}{7}\right)\cdot\left(-\frac{7}{2}\right) \quad (2)$$

$$x = \pm 1 \quad (3)$$

$$\implies r = \pm\frac{7}{2} \quad (4)$$

The signal corresponding to this is

$$\text{From Table 1: } x(n) = x(0)r^n\, u(n) \quad (5)$$

Applying z-Transform :

$$x(n) \overset{Z}{\longleftrightarrow} X(z)$$

$$\implies X_1(z) = \left(\frac{1}{7}\right)\left(\frac{4}{7z^{-1}+2}\right)\left\{z \in \mathbb{C} : |z| > \frac{7}{2}\right\} \quad (6)$$

$$\implies X_2(z) = \left(\frac{1}{7}\right)\left(\frac{4}{7z^{-1}-2}\right)\left\{z \in \mathbb{C} : |z| > \frac{7}{2}\right\} \quad (7)$$

Variable	Description	Value
$x(0)$	First term of the GP	$-\left(\frac{2}{7}\right)$
$x(1)$	Second term of the GP	x
$x(2)$	Third term of the GP	$-\left(\frac{7}{2}\right)$
r	Common ratio of the GP	$\pm\left(\frac{7}{2}\right)$
$x(n)$	General term	$x(0)\, r^n\, u(n)$

TABLE 1: Variables Used

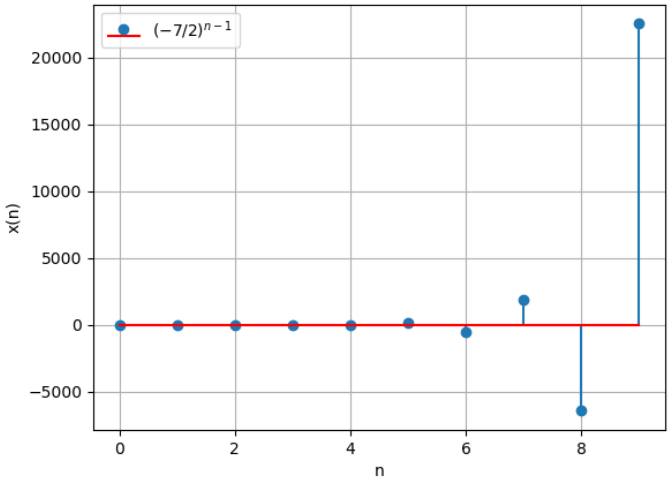

Fig. 1: Stem Plot of x_1(n)

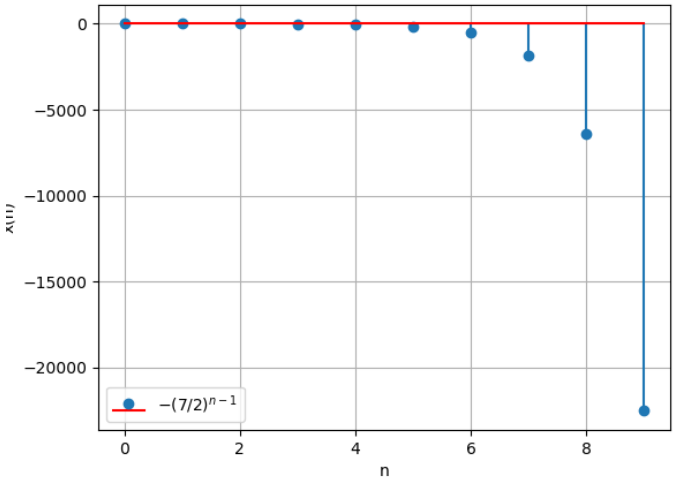

Fig. 2: Stem Plot of $x_2(n)$