

NCERT-discrete : 11.9.3 - 21

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I. QUESTION

Find four numbers forming a geometric progression in which the third term is greater than the first term by 9, and the second term is greater than the 4th by 18.

Solution:

Symbols	Description	Values
r	Common ratio of the GP	-2
$x(n)$	$(n + 1)^{th}$ term of the Sequence	$x(0)r^n u(n)$
$x(0)$	First term of the GP	3
$x(2) - x(0)$	First constraint	9
$x(1) - x(3)$	Second constraint	18

TABLE 0

PARAMETERS, DESCRIPTIONS, AND VALUES

From the constraints given in 0:

$$x(0)r^2 - 9 = x(0) \quad (1)$$

$$x(0)r + 18 = x(0)r^3 \quad (2)$$

$$\implies x(0)(r^2 - 1) = 9 \quad (3)$$

$$\implies x(0)r(r^2 - 1) = 18 \quad (4)$$

By dividing (3) and (4) and solving ,we get:

$$\implies x(0) = 3 \quad (5)$$

$$\implies r = -2 \quad (6)$$

Z-Transform for $x(n)$: Using (??) :

$$X(z) = (1 + 2z^{-1})^{-1}, \quad |z| > 2 \quad (7)$$

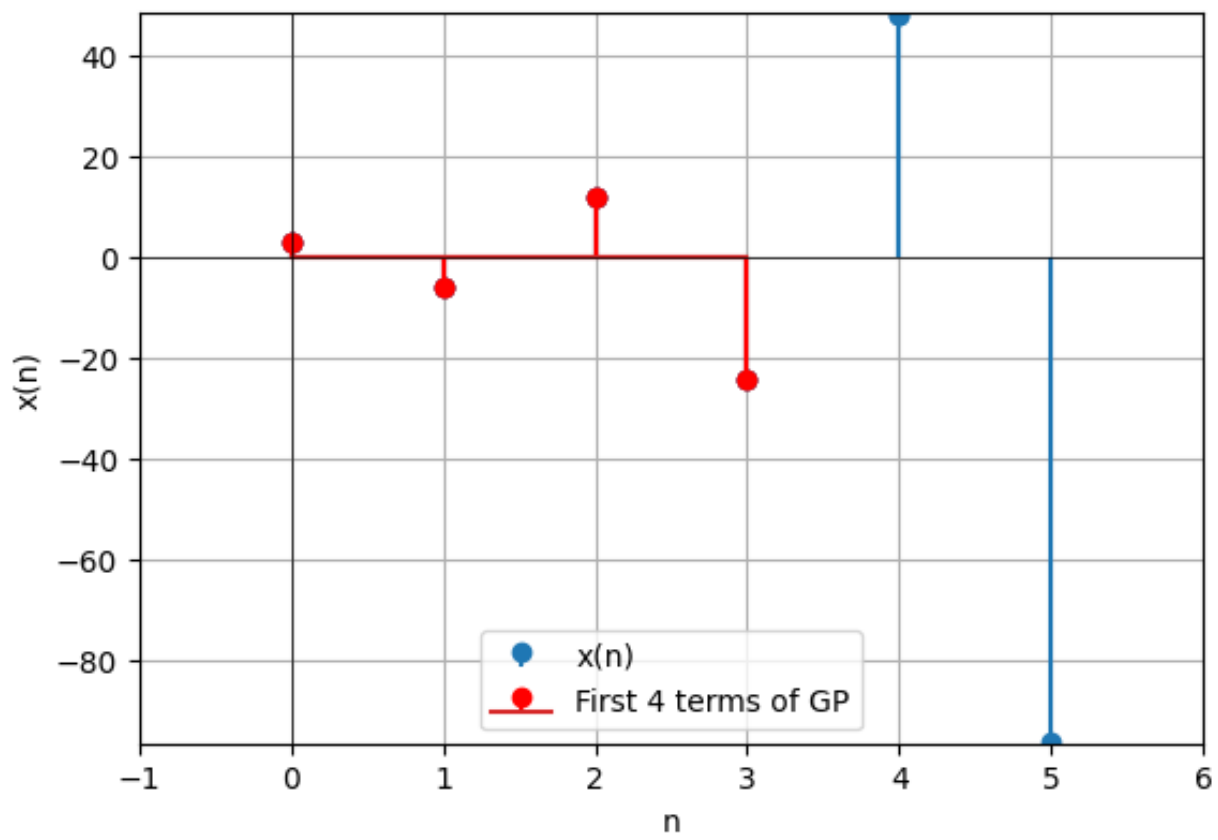


Fig. 0. $x(n)$ vs n