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 4^{th} 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:

$$x(0)\,r^2 - 9 = x(0) \tag{1}$$

$$x(0)\,r + 18 = x(0)\,r^3 \tag{2}$$

$$\implies x(0)(r^2-1) = 9 \tag{3}$$

$$\implies x(0)r(r^2-1) = 18 \tag{4}$$

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

$$\implies x(0) = 3 \tag{5}$$

$$\implies r = -2 \tag{6}$$

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

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

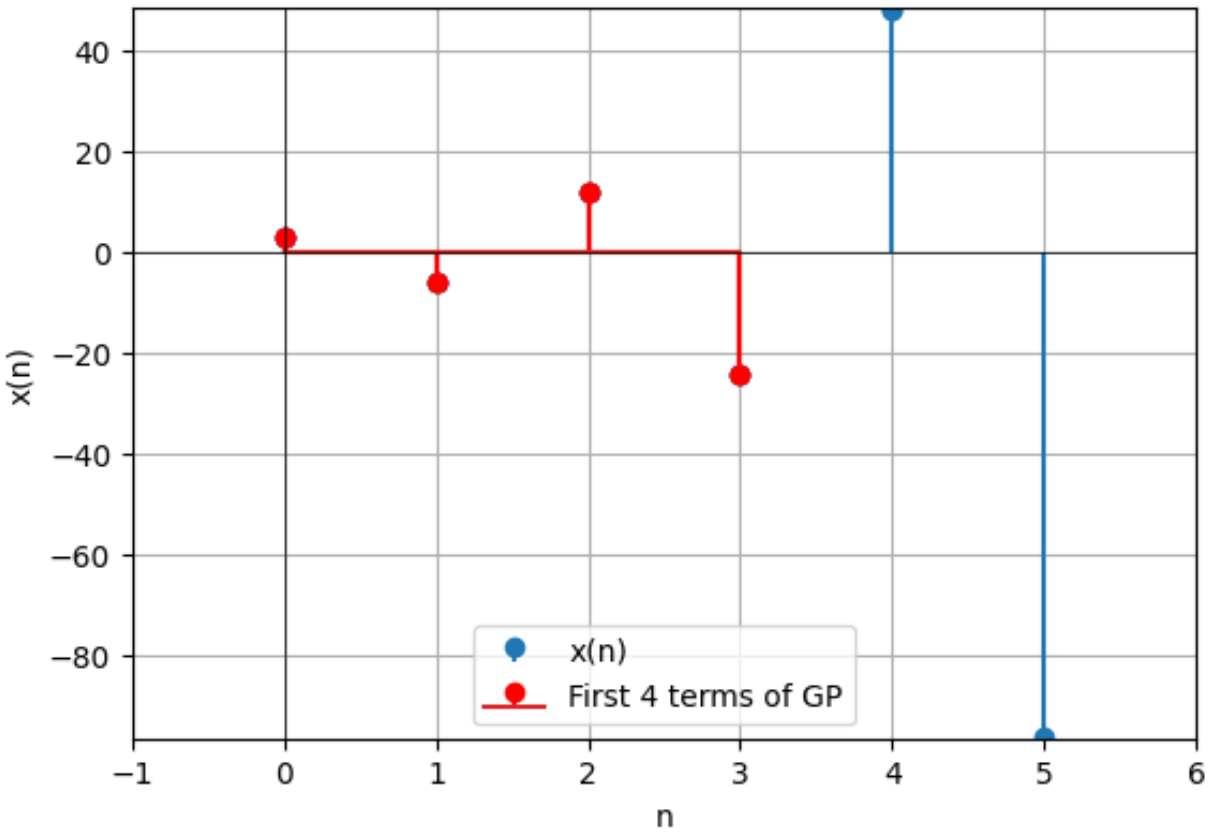

Fig. 0. $x(n)$ vs n