

# 11.9.3.13

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## QUESTION:

1. How many terms of G.P.  $3, 3^2, 3^3, \dots$  are needed to give the sum 120 ?

## Solution:

Parameter	Description	Value
$n$	No. of terms in the G.P	4
$x(0)$	first term in the G.P	3
$r$	common ratio in the G.P	3
$x(n)$	$n^{\text{th}}$ term in G.P	$x(0)r^n u(n)$

TABLE I  
VARIABLES

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

$$= \frac{3}{1 - 3z^{-1}} \quad (2)$$

$$U(z) = \frac{1}{1 - z^{-1}} \quad |z| > 1 \quad (3)$$

$$s(n) = x(n) * u(n) \quad (4)$$

$$S(z) = X(z)U(z) \quad (5)$$

$$= \left( \frac{3}{1 - 3z^{-1}} \right) \left( \frac{1}{1 - z^{-1}} \right) \quad |z| > 3 \quad (6)$$

by using sum to  $n$  terms in G.P

$$s(n) = a \left( \frac{r^n - 1}{r - 1} \right) \quad (7)$$

$$120 = \frac{3^{n+1} - 3}{2} \quad (8)$$

$$n = 4 \quad (9)$$

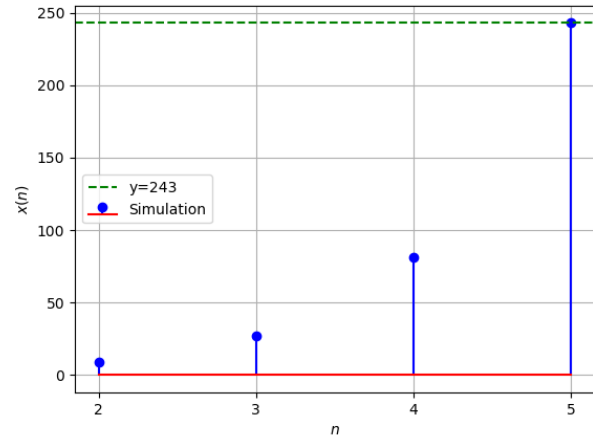


Fig. 1. Stem plot of  $x(n)$

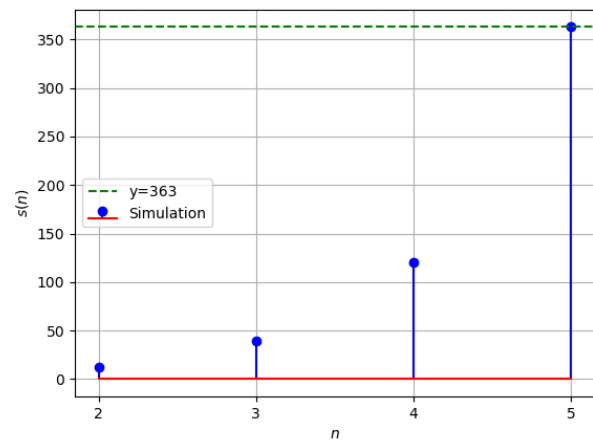


Fig. 2. Stem plot of  $s(n)$