

Assignment-2

EE:1205 (*Signals Systems*)

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Question 11.9.3.22

If the first and the n th term of a G.P. are a and b , respectively, and if P is the product of n terms, prove that $P^2 = (ab)^n$

Solution:

Parameter	Description
$x(0)$	First Term
r	Common Ratio
$x(n)$	n^{th} term

TABLE 0

PARAMETER TABLE 11.9.3.22

$$x(n) = x(0) r^n \quad (1)$$

$$(x(0) x(n))^n = (x(0))^{2n} r^{n^2} \quad (2)$$

$$P = \prod_{k=0}^n x(0) r^k = (x(0))^n r^{\frac{n^2}{2}} \quad (3)$$

$$P^2 = (x(0))^{2n} r^{n^2} \quad (4)$$

From (2) and (4), $P^2 = (x(0) x(n))^n$

Z-transform of $x(n)$:

$$X(z) = \frac{x(0)}{1 - rz^{-1}}, \quad |z| > r \quad (5)$$

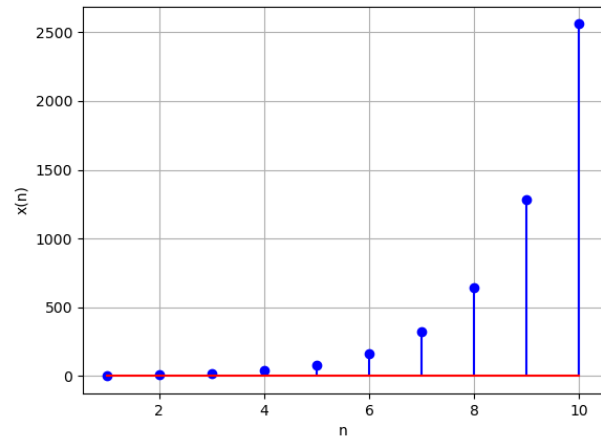


Fig. 0. Plot of $x(n) = (5)(2)^n$