

11.9.3.3

EE23BTECH11065 - prem sagar

Question:

The 5th, 8th and 11th terms of a GP are p, q and s respectively. show that

$$q^2 = ps$$

solution:

let r be common ratio

Symbol	Value	Description
$x(5)$	$p = x(0)r^5$	5th term of G.P
$x(8)$	$q = x(0)r^8$	8th term of G.P
$x(11)$	$s = x(0)r^{11}$	11th term of G.P
$x(n)$	$x(0)r^n$	nth term of G.P

TABLE 1
INPUT PARAMETERS

From Table 1:

$$\Rightarrow x(8) x(8) = x(0) r^8 x(0) r^8 \quad (1)$$

$$= x(0)^2 r^{16} \quad (2)$$

$$\Rightarrow x(5) x(11) = x(0) r^5 x(0) r^{11} \quad (3)$$

$$= x(0)^2 r^{16} \quad (4)$$

$$\Rightarrow x(8)^2 = x(5) x(11) \quad (5)$$

$$q^2 = ps \quad (6)$$

Applying z-Transform:

$$\Rightarrow X(z) = \frac{x(0)}{1 - r z^{-1}}, |z| > |r| \quad (7)$$

$$r = \left(\frac{s}{p} \right)^{\frac{1}{6}} \quad (8)$$

$$x(0) = \frac{p^{\frac{11}{6}}}{s^{\frac{5}{6}}} \quad (9)$$

$$\Rightarrow X(z) = \frac{p^3}{p^{\frac{7}{6}} s^{\frac{5}{6}} - q^2 z^{-1}} \quad (10)$$

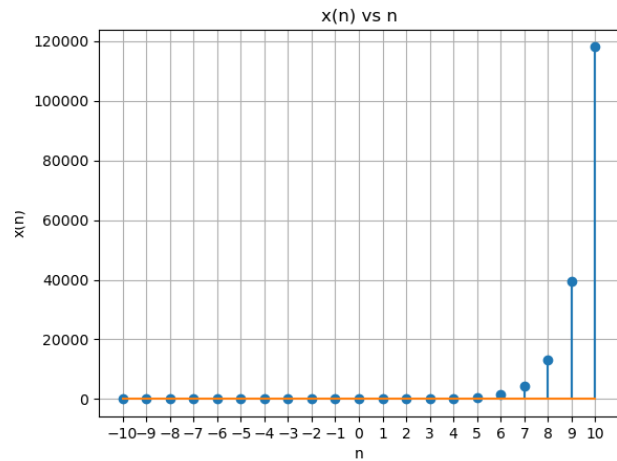


Fig. 1. plot x(n) vs n p=486, q=13122, s=118098, r=3