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:

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 0
INPUT PARAMETERS

$$x(n) = x(0)\, r^n \tag{1}$$
$$x(5) = x(0)\, r^5 \tag{2}$$
$$x(8) = x(0)\, r^8 \tag{3}$$
$$x(11) = x(0)\, r^{11} \tag{4}$$
$$x(8)\, x(8) = x(0)\, r^8\, x(0)\, r^8 \tag{5}$$
$$= x(0)^2\, r^{16} \tag{6}$$
$$x(5)\, x(11) = x(0)\, r^5\, x(0)\, r^{11} \tag{7}$$
$$= x(0)^2\, r^{16} \tag{8}$$
$$x(8)^2 = x(5)\, x(11) \tag{9}$$
$$q^2 = ps \tag{10}$$

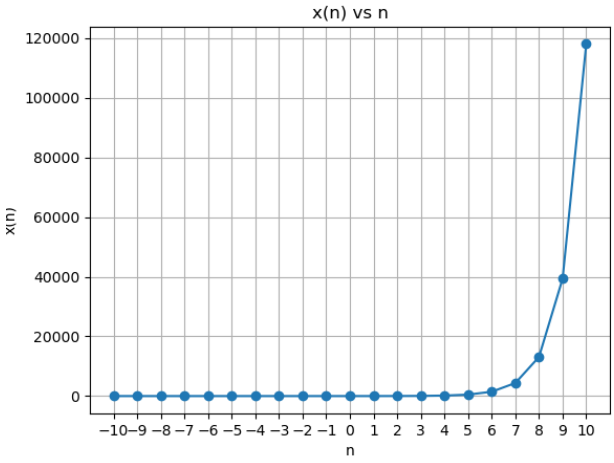

Fig. 0. plot x(n) vs n

$$x(n) \overset{Z}{\longleftrightarrow} X(Z) \tag{11}$$
$$x(n) = x(0)\, r^n\, u(n) \tag{12}$$
$$X(Z) = \sum_{n=-\infty}^{\infty} x(n) Z^{-n} \tag{13}$$
$$= \frac{x(0)}{1 - r\, z^{-1}} \quad , |z| > |r| \tag{14}$$