EE23BTECH11047 - Deepakreddy P

250

200

100

50

0.00

0.0

0.5

1.0

(1)

17 If a, b, c, d are in G.P, prove that $(a^n + b^n), (b^n + c^n), (c^n + d^n)$ are in G.P

Solution:

TABLE I Input Parameters

Symbol	Input value
r	$\frac{x(n)}{x(n-1)}$
x(0)	а
<i>x</i> (1)	b
x(2)	c
<i>x</i> (3)	d

$$r = \frac{b}{a} = \frac{c}{b} = \frac{d}{c}$$

From eq(1)

$$= \frac{b^{n} + c^{n}}{a^{n} + b^{n}}$$

$$= \frac{(ar^{1})^{n} + (ar^{2})^{n}}{(ar^{0})^{n} + (ar^{1})^{n}}$$

$$= \frac{r^{n} ((ar^{1})^{n} + (ar^{2})^{n})}{r^{n} ((ar^{0})^{n} + (ar^{1})^{n})}$$

$$= \frac{(ar^{2})^{n} + (ar^{3})^{n}}{(ar^{1})^{n} + (ar^{2})^{n}}$$

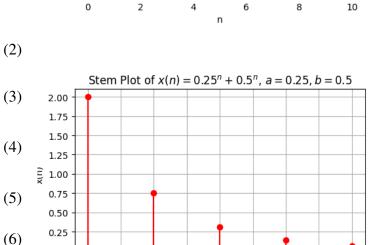
$$= \frac{c^n + d^n}{b^n + c^n}$$

$$\Longrightarrow \frac{b^n + c^n}{a^n + b^n} = \frac{c^n + d^n}{b^n + c^n}$$

$$(6)$$

$$\implies \frac{x(1)^n + x(2)^n}{x(0)^n + x(1)^n} = \frac{x(2)^n + x(3)^n}{x(1)^n + x(2)^n}$$
(8)

(9)



1.5

2.0

2.5

3.5

Stem Plot of $x(n) = (0.25)2^n$, a = 0.25, r = 2

Hence proved they are in in G.P

$$x(n) = ar^n u(n) \tag{10}$$

$$X(z) = \frac{a}{1 - rz^{-1}}, \quad |z| > |r| \tag{11}$$