

11.9.5-13

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question:

$$\frac{a + bx}{a - bx} = \frac{b + cx}{b - cx} = \frac{c + dx}{c - dx} \quad (1)$$

then show that a,b,c,d are in G.P

solution:

let,

$$\frac{b}{a} = \frac{c}{b} = \frac{d}{c} = r \quad (2)$$

parameter	description	value
$x(0)$	first term	a
$x(1)$	second term	b
$x(2)$	third term	c
$x(3)$	fourth term	d
r	common ratio	$\frac{b}{a}$
n	no of terms	4
$x(n)$	n^{th} term	$x(0) r^n$

TABLE 0: input parameters

$$\frac{a + bx}{a - bx} = \frac{a + arx}{a - arx} \quad (3)$$

$$= \frac{1 + rx}{1 - rx} \quad (4)$$

$$\frac{b + cx}{b - cx} = \frac{ar + ar^2x}{ar - ar^2x} \quad (5)$$

$$= \frac{1 + rx}{1 - rx} \quad (6)$$

$$\frac{c + dx}{c - dx} = \frac{ar^2 + ar^3x}{ar^2 - ar^3x} \quad (7)$$

$$= \frac{1 + rx}{1 - rx} \quad (8)$$

As, equations

$$(4) = (6) = (8) \quad (9)$$

so, a,b,c,d are in G.P

Applying z-transform

$$X(z) = \frac{a^2}{a - bz^{-1}} \quad |z| > \left| \frac{b}{a} \right| \quad (10)$$