

NCERT Discrete 10.5.2 -15

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Question: For what value of n , are the n th terms of two A.Ps: 63, 65, 67,... and 3, 10, 17,... equal?

Solution:

Parameter	Sub-question	Description	Value
$x_i(0)$	$x_1(0)$	1 st term of 1 st A.P.	63
	$x_2(0)$	1 st term of 2 nd A.P.	3
d_i	d_1	Common difference of 1 st A.P.	2
	d_2	Common difference of 2 nd A.P.	7

TABLE I
INPUT VALUES

$$x_i(n) = x(0)u(n) + dnu(n) \quad (1)$$

$$X(z) = \frac{x(0)}{1 - z^{-1}} + \frac{dz^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (2)$$

1)

$$x_1(n) = 63u(n) + 2nu(n) \quad (3)$$

$$X_1(z) = \frac{63}{1 - z^{-1}} + \frac{2z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (4)$$

2)

$$x_2(n) = 3u(n) + 7nu(n) \quad (5)$$

$$X_2(z) = \frac{3}{1 - z^{-1}} + \frac{7z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (6)$$

3) given,

$$x_1(n) = x_2(n) \quad (7)$$

$$\therefore 63 + 2n = 7n + 3 \quad (8)$$

$$\implies n = 12 \quad (9)$$

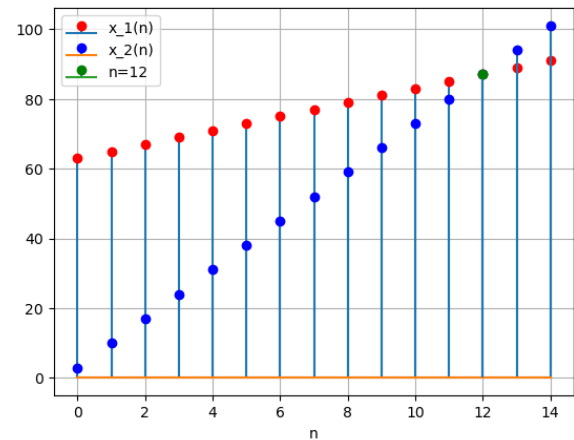


Fig. 1. Graphs of $x_1(n)$ and $x_2(n)$ and both are equal at $n = 12$