

# 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 <sup>st</sup> term of 1 <sup>st</sup> A.P. | 63    |
|           | $x_2(0)$     | 1 <sup>st</sup> term of 2 <sup>nd</sup> A.P. | 3     |
| $d_i$     | $d_1$        | Common difference of 1 <sup>st</sup> A.P.    | 2     |
|           | $d_2$        | Common difference of 2 <sup>nd</sup> 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,

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

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

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

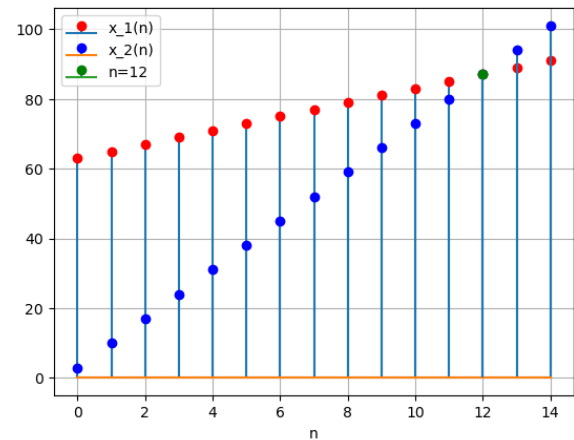


Fig. 1. Graphs of  $x_1(n)$  and  $x_2(n)$  and both are equal at  $n = 12$