NCERT Discrete - 10.5.2.2

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Question 10.5.2.2:

1) 30th term of the AP: 10, 7, 4, ... is
2) 11th term of the AP: $-3, -\frac{1}{2}, 2, \ldots$ is

Solution:

Parameter	value	Description
$x_i(0)$	10	First
	-3	term
d_i	-3	Common
	$\frac{5}{2}$	difference
$x_1(29)$	?	30th term
$x_2(10)$	?	11th term

TABLE 2

INPUT PARAMETERS

The $(n + 1)th$ term of the AP is given by:

$$x_i(n) = [x_i(0) + n \times d_i]\, u(n) \quad (1)$$

1) From the equation (1) and the values from the table Table 2 :

$$x_1(n) = [10 + n(-3)]\, u(n) \quad (2)$$
$$x_1(29) = [10 + (29)(-3)]\,(u(n)) \quad (3)$$
$$= [10 + 29(-3)]\,(1) \quad (4)$$
$$= 10 + (-87) \quad (5)$$
$$= -77 \quad (6)$$
$$X_1(z) = \frac{10 - 13z^{-1}}{(1 - z^{-1})^2}\, [ROC : |z| > 1] \quad (7)$$

So, the 30th term of the AP is -77.

2) From the equation (1) and the values from the table Table 2 :

$$x_2(n) = \left[-3 + n\frac{5}{2}\right] u(n) \quad (8)$$

$$x_2(10) = \left[-3 + (10)\left(\frac{5}{2}\right)\right](u(n)) \quad (9)$$

$$= [-3 + 10(2.5)]\,(1) \quad (10)$$
$$= -3 + 25 \quad (11)$$
$$= 22 \quad (12)$$

$$X_2(z) = \frac{0.5z^{-1} - 3}{(1 - z^{-1})^2}\, [ROC : |z| > 1] \quad (13)$$
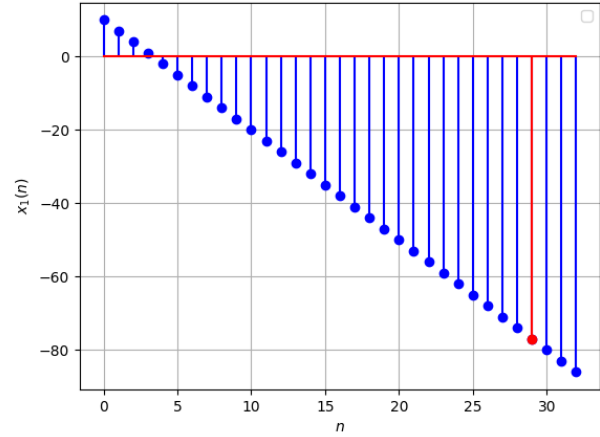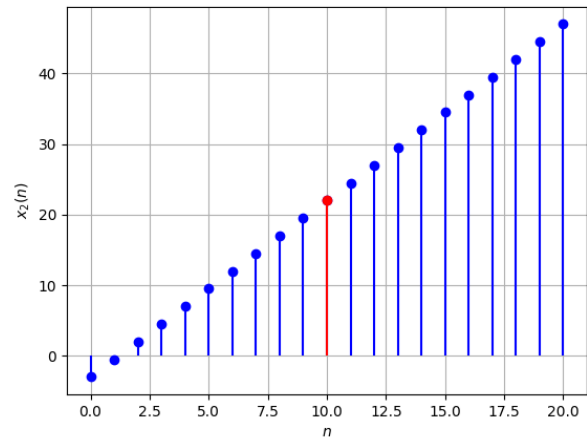
so, the 11th term of the AP is 22.

Fig. 1. stem plot of $x_1(n)$

Fig. 2. stem plot of $x_2(n)$