10.05.2.3

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QUESTION:
1. In the following APs, find the missing terms in the boxes:
(i) 2, _, 26
(ii) _, 13, _, 3
(iii)5, _, _,$9\frac{1}{2}$
(iv)- 4, _, _, _, _, 6
(v)_, 38, _, _, _,' −22'

Solution:

Parameter	Description
n	No. of terms in the A.P
$x(0)$	first term in the A.P
d	common difference in the A.P
$x(n) = x(0) + nd$	$(n+1)^{th}$ term in A.P

TABLE I

VARIABLES

1)

$$26 = 2 + 2d \qquad (1)$$
$$24 = 2d \qquad (2)$$
$$\therefore d = 12 \qquad (3)$$
$$x(1) = 14 \qquad (4)$$

The Z-transform of $x(n) = 2 + 12n$ is given by:

$$X(z) = \frac{2 + 10z^{-1}}{(1 - z^{-1})^2} \qquad |z| > 1 \qquad (5)$$

$$(6)$$

2)

$$3 - 13 = 2d \qquad (7)$$
$$-10 = 2d \qquad (8)$$
$$\therefore d = -5 \qquad (9)$$
$$x(1) = 18 \qquad (10)$$
$$x(2) = 8 \qquad (11)$$

The Z-transform of $x(n) = 18 - 5n$ is given by:

$$X(z) = \frac{18 - 23z^{-1}}{(1 - z^{-1})^2} \qquad |z| > 1 \qquad (12)$$

$$(13)$$

3)

$$9\frac{1}{2} = 5 + 3d \qquad (14)$$
$$3d = \frac{9}{2} \qquad (15)$$
$$\therefore d = \frac{3}{2} \qquad (16)$$
$$x(1) = 6\frac{1}{2} \qquad (17)$$
$$x(2) = 8 \qquad (18)$$

Z-transform of $x(n) = 5 + \frac{3}{2}n$ is given by:

$$X(z) = \frac{5 - \frac{7}{2}z^{-1}}{(1 - z^{-1})^2} \qquad |z| > 1 \qquad (19)$$

$$(20)$$

4)

$$6 = -4 + 5d \qquad (21)$$
$$10 = 5d \qquad (22)$$
$$\therefore d = 2 \qquad (23)$$
$$x(1) = -2 \qquad (24)$$
$$x(2) = 0 \qquad (25)$$
$$x(3) = 2 \qquad (26)$$
$$x(4) = 4 \qquad (27)$$

Z-transform of $x(n) = -4 + 2n$ is given by:

$$X(z) = \frac{-4 + 6z^{-1}}{(1 - z^{-1})^2} \qquad |z| > 1 \qquad (28)$$

$$(29)$$

5)

$$-22 - 38 = 4d \tag{30}$$
$$-60 = 4d \tag{31}$$
$$\therefore d = -15 \tag{32}$$
$$x(0) = 53 \tag{33}$$
$$x(2) = 23 \tag{34}$$
$$x(3) = 8 \tag{35}$$
$$x(4) = -7 \tag{36}$$
$$\tag{37}$$

Z-transform of $x(n) = 53 - 15n$ is given by:
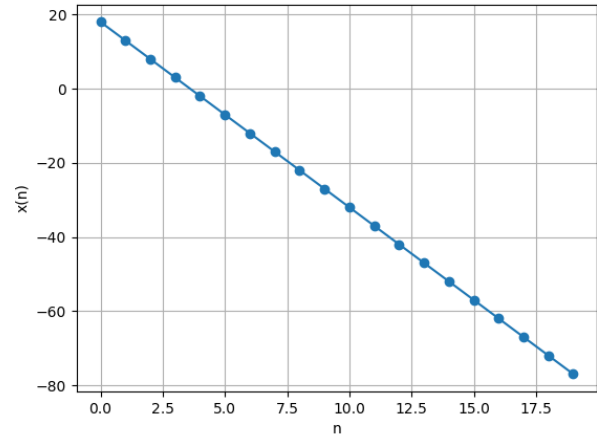
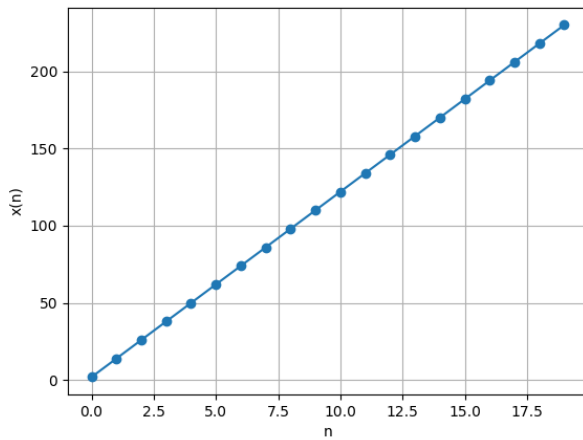$$X(z) = \frac{53 - 68z^{-1}}{(1 - z^{-1})^2} \qquad |z| > 1 \tag{38}$$
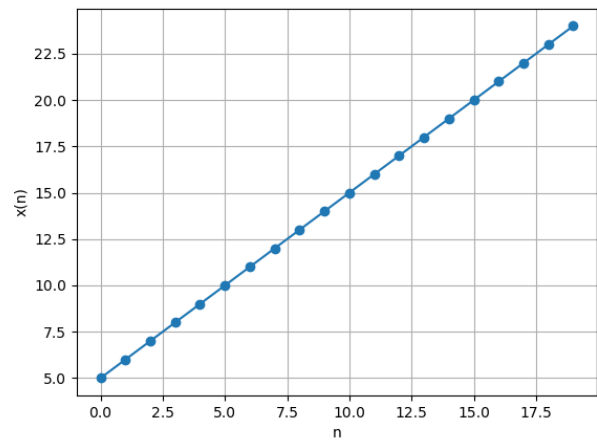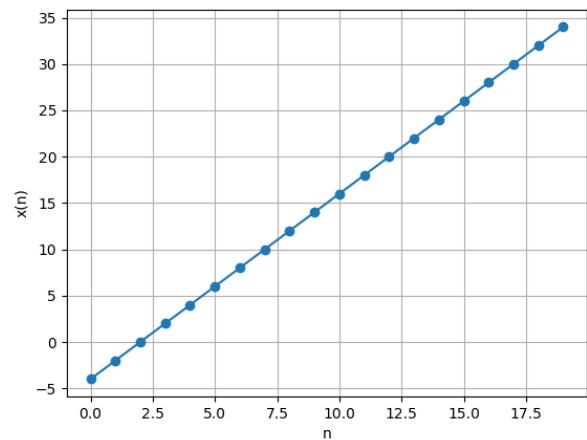$$\tag{39}$$

Fig. 2.

Fig. 1.

Fig. 3.

Fig. 4.

Fig. 5.