

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

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

$$X(z) = \frac{18 - 23z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (11)$$

3)

$$9 \frac{1}{2} = 5 + 3d \quad (12)$$

$$3d = \frac{9}{2} \quad (13)$$

$$\therefore d = \frac{3}{2} \quad (14)$$

$$x(1) = 6 \frac{1}{2} \quad (15)$$

$$x(2) = 8 \quad (16)$$

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

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

$$X(z) = \frac{5 - \frac{7}{2}z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (17)$$

1)

$$26 = 2 + 2d \quad (1)$$

$$24 = 2d \quad (2)$$

$$\therefore d = 12 \quad (3)$$

$$x(1) = 14 \quad (4)$$

4)

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

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

$$6 = -4 + 5d \quad (18)$$

$$10 = 5d \quad (19)$$

$$\therefore d = 2 \quad (20)$$

$$x(1) = -2 \quad (21)$$

$$x(2) = 0 \quad (22)$$

$$x(3) = 2 \quad (23)$$

$$x(4) = 4 \quad (24)$$

2)

$$3 - 13 = 2d \quad (6)$$

$$-10 = 2d \quad (7)$$

$$\therefore d = -5 \quad (8)$$

$$x(1) = 18 \quad (9)$$

$$x(2) = 8 \quad (10)$$

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

$$X(z) = \frac{-4 + 6z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (25)$$

5)

$$-22 - 38 = 4d \quad (26)$$

$$-60 = 4d \quad (27)$$

$$\therefore d = -15 \quad (28)$$

$$x(0) = 53 \quad (29)$$

$$x(2) = 23 \quad (30)$$

$$x(3) = 8 \quad (31)$$

$$x(4) = -7 \quad (32)$$

Z-transform of $x(n) = (53 - 15n)u(n)$ is given by:

$$X(z) = \frac{53 - 68z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (33)$$

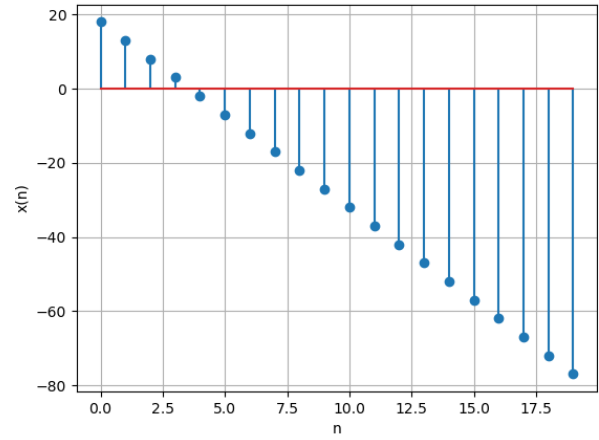


Fig. 2.

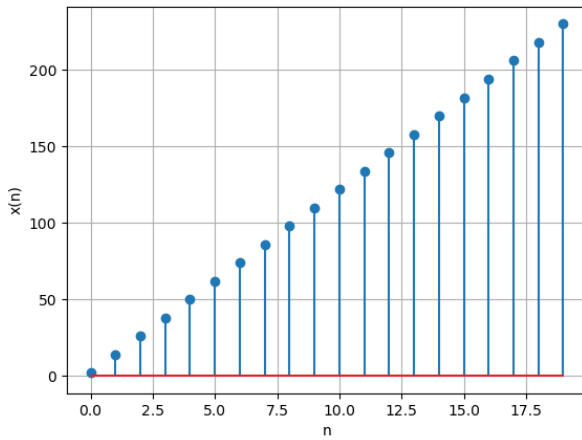


Fig. 1.

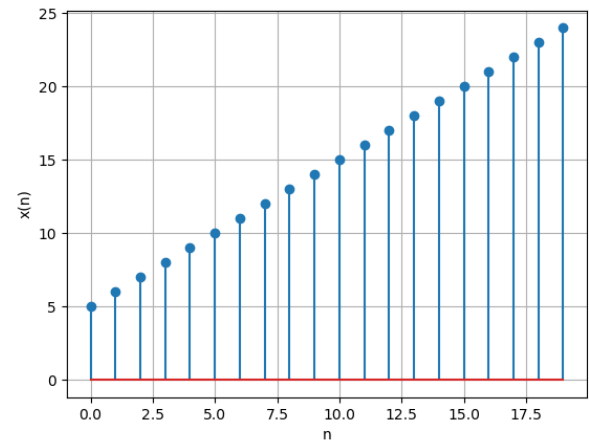


Fig. 3.

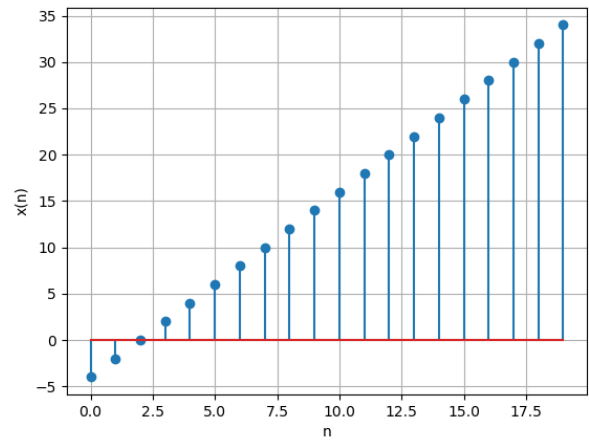


Fig. 4.

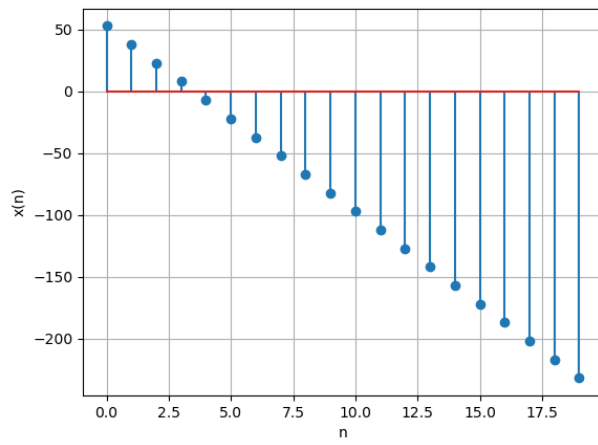


Fig. 5.