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)

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

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

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

2)

$$3 - 13 = 2d \tag{6}$$
$$-10 = 2d \tag{7}$$
$$\therefore d = -5 \tag{8}$$
$$x(1) = 18 \tag{9}$$
$$x(2) = 8 \tag{10}$$

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

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

3)

$$9\ \frac{1}{2} = 5 + 3d \tag{12}$$
$$3d = \frac{9}{2} \tag{13}$$
$$\therefore d = \frac{3}{2} \tag{14}$$
$$x(1) = 6\ \frac{1}{2} \tag{15}$$
$$x(2) = 8 \tag{16}$$

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

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

4)

$$6 = -4 + 5d \tag{18}$$
$$10 = 5d \tag{19}$$
$$\therefore d = 2 \tag{20}$$
$$x(1) = -2 \tag{21}$$
$$x(2) = 0 \tag{22}$$
$$x(3) = 2 \tag{23}$$
$$x(4) = 4 \tag{24}$$

$Z - transformofx(n) = (-4 + 2n)u(n)$is given by:

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

5)

$$-22 - 38 = 4d \tag{26}$$
$$-60 = 4d \tag{27}$$
$$\therefore d = -15 \tag{28}$$
$$x(0) = 53 \tag{29}$$
$$x(2) = 23 \tag{30}$$
$$x(3) = 8 \tag{31}$$
$$x(4) = -7 \tag{32}$$

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

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

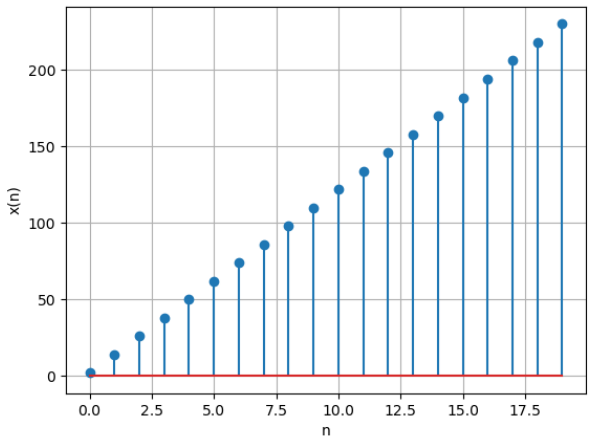

Fig. 1.

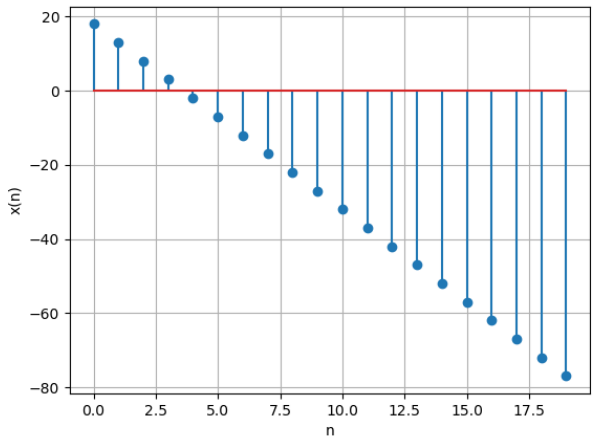

Fig. 2.

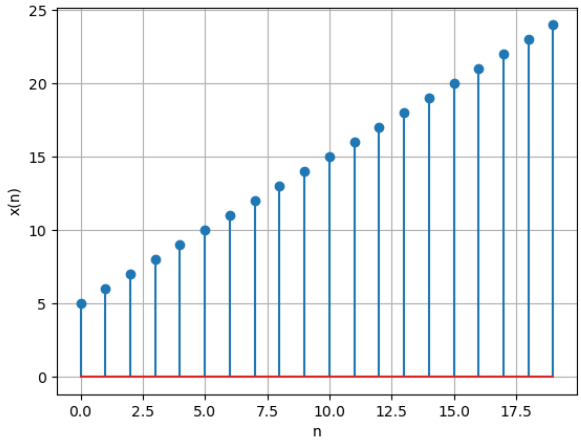

Fig. 3.

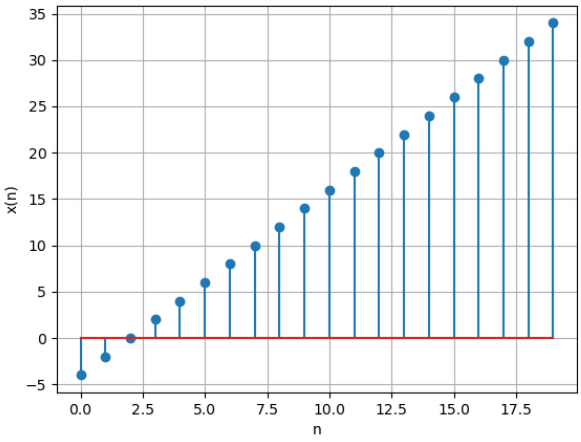

Fig. 4.

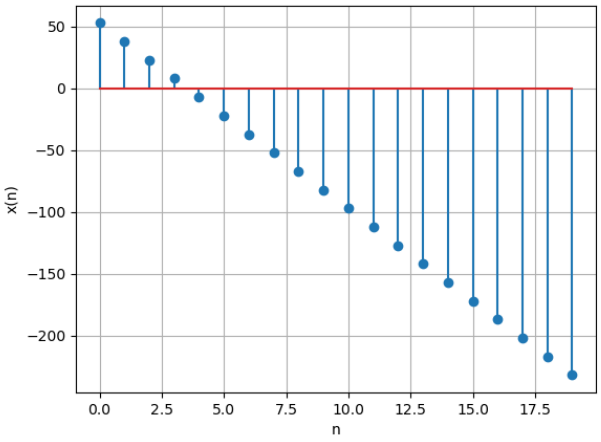

Fig. 5.