NCERT Discrete - 10.5.2.1

EE23BTECH11037 - M Esha*

Question 10.5.2.1:
Fill in the blanks in the following table given that a is the first term, d is the common difference, and a_n is the nth term of the AP.

i	$x_i(0)$	d_i	n_i	$a_i(n)$
1	7	3	7 (8^{th} term)	...
2	-18	...	9 (10^{th} term)	0
3	...	-3	17 (18^{th} term)	-5
4	-18.9	2.5	...	3.6
5	3.5	0	104 (105^{th} term)	...

Solution: for A.P,

$$x_i(n) = [x_i(0) + nd_i]\,u(n) \tag{1}$$

1) From (1) Table :

$$x_1(n) = [7 + 3n]\,u(n) \tag{2}$$
$$x_1(7) = 28 \tag{3}$$
$$X_1(z) = \frac{7 - 4z^{-1}}{(1 - z^{-1})^2} \quad |z| \neq 1 \tag{4}$$

2) From (1) and Table :

$$x_2(n) = [-18 + 2n]\,u(n) \tag{5}$$
$$x_2(9) = 0 \tag{6}$$
$$d_2 = 2 \tag{7}$$
$$X_2(z) = \frac{-18 + 20z^{-1}}{(1 - z^{-1})^2} \quad |z| \neq 1 \tag{8}$$

3) From (1) Table :

$$x_3(n) = [x_3(0) - 3n]\,u(n) \tag{9}$$
$$x_3(17) = -5 \tag{10}$$
$$x_3(0) = 49 \tag{11}$$
$$X_3(z) = \frac{49 - 52z^{-1}}{(1 - z^{-1})^2} \quad |z| \neq 1 \tag{12}$$

4) From (1) Table :

$$x_4(n) = [18.9 + 2.5n]\,u(n) \tag{13}$$
$$x_4(n) = 3.6 \tag{14}$$
$$n_4 = 9 \tag{15}$$
$$X_4(z) = \frac{18.9 - 16.4z^{-1}}{(1 - z^{-1})^2} \quad |z| \neq 1 \tag{16}$$

5) From (1) Table :

$$x_5(n) = [18.9 + 2.5n]\,u(n) \tag{17}$$
$$x_5(104) = 3.6 \tag{18}$$
$$X_4(z) = \frac{3.5}{1 - z^{-1}} \quad |z| \neq 1 \tag{19}$$

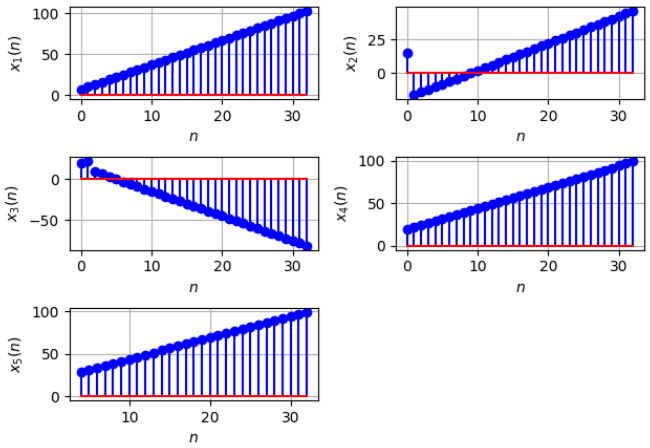

Fig. 5. stem plots