

Difference Equations:

A difference equation is a relation b/w the differences of an unknown function at one or more general values of the argument.

Formation of difference equations:

1) Form the difference equation from i) $y_n = a + b3^n$
ii) $y_n = A2^n + Bn$

i) $y_n = a + b3^n$ — (1)

$$y_{n+1} = a + b3^{n+1} = a + b3^n \cdot 3 \text{ — (2)}$$

$$y_{n+2} = a + b3^{n+2} = a + b3^n \cdot 9 \text{ — (3)}$$

iii) $y_n = A3^n \rightarrow$ (1)

$$y_{n+1} = A3^{n+1} = A3^n \cdot 3 \rightarrow$$
 (2)

$$\begin{vmatrix} y_n & 1 \\ y_{n+1} & 3 \end{vmatrix} = 0$$

$$\Rightarrow 3y_n - y_{n+1} = 0$$

iv) $y_n = A2^n$ — (1)

$$y_{n+1} = A2^{n+1} = A2^n \cdot 2 \text{ — (2)}$$

$$\begin{vmatrix} y_n & 1 \\ y_{n+1} & 2 \end{vmatrix} = 0$$

$$\Rightarrow 2y_n - y_{n+1} = 0.$$

Eliminating from ①, ② and ③. we get A & B

$$\begin{vmatrix} y_n & 1 & 1 \\ y_{n+1} & 1 & 3 \\ y_{n+2} & 1 & 9 \end{vmatrix} = 0$$

$$y_n [9-3] - 1 [9y_{n+1} - 3y_{n+2}] + 1 [y_{n+1} - y_{n+2}] = 0.$$

$$6y_n - 8y_{n+1} + 2y_{n+2} = 0 \div 2.$$

$$3y_n - 4y_{n+1} + y_{n+2} = 0.$$