**UNIT 5 Z - Transforms and Difference equations**
**Formation of Difference Equations**

## Difference Equations

A difference equation is a relation between 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) $y_n = A2^n + Bn$

Soln

i) $y_n = a + b3^n \rightarrow (1)$

$y_{n+1} = a + b3^{n+1}$

$= a + b3^n \cdot 3^1 \rightarrow (2)$

$y_{n+2} = a + b3^{n+2}$

$= a + b3^n \cdot 9 \rightarrow (3)$

Eliminating from (1), (2) and (3).

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

$y_n(9-3) - 1(9y_{n+1} - 3y_{n+2}) + (y_{n+1} - y_{n+2}) = 0$

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

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

$y_n = A3^n$

$y_{n+1} = A3^{n+1} = A3^n \cdot 3$

$y_{n+2} = \ldots$

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

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