Polynomial Reduction –
Solving Non – homogeneous Equations

For a non – homogeneous function, $f(n)$ is not zero in the general equation. Hence, the characteristic non – homogeneous form can be expressed as follows:

$$a_0 t_n + a_1 t_{n-k} + \cdots + a_k t_{n-1} = b^n p(n)$$

Here b is a constant and $p(n)$ is a polynomial . The characteristic equation for this can be written as follows:

$$\left(a_0 r^k a_1 r^{k-1} + a_1 r^{k-1} + \cdots + a_k\right)(r-b)^{d+1} = 0$$

Here \`d\` is the degree of the polynomial.

The steps for solving a non – homogeneous equation are as follows:

1. Ignore $f(n)$ and solve the homogoneous part assuming that $f(n) = 0$.

2. Restore $f(n)$ and find a solution for the non-homogenous part that is rewritten as $(r-b)^{d+1}$ by ignoring the boundary conditions.

3. Form the general solution by considering all the roots obtained by performing steps 1 and 2.

4. Use boundary conditions to determine the specific solution for the given recurrence equation.

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