

Method of Variation of Parameter :

$$a_0(x)y'' + a_1(x)y' + a_2(x)y = r(x)$$

Corresponding Homogeneous Equation :

$$a_0(x)y'' + a_1(x)y' + a_2(x)y = 0$$

If $y_1(x)$ & $y_2(x)$ are two roots of above Eqⁿ.

$$C.F = A y_1(x) + B y_2(x)$$

Replace A by $A(x)$ & B by $B(x)$

$$C.F = \underline{A(x)y_1(x)} + \underline{B(x)y_2(x)}$$

Now

$$A(x) = - \int \frac{g(x) y_2(x)}{w(x)} + C_1$$

$$B(x) = \int \frac{g(x) y_1(x)}{w(x)} + C_2$$

$$\text{where ; } g(x) = \frac{r(x)}{a_0(x)}$$

$$w(x) = \begin{vmatrix} y_1(x) & y_2(x) \\ y_1'(x) & y_2'(x) \end{vmatrix} \neq 0 \quad \text{Known as} \\ \text{Wronskian of } y_1(x) \& y_2(x)$$