August 29,2020 (2nd session)

Variation of parameters

let $f(D)y = (a_0 D^2 + a_1 D + a_2)y = g(x)$

be a non-homogeneous differential equation of oxder two. If if, the complementary function of 0 is given by

y = 0,4 + 0, 4

them the particular integral of 10 is

given by

 $y = Ay_{t}By_{2}$

 $i A = -\int \frac{g_2 \cdot g(x)}{w(x)} dx$

 $B = + \int \frac{y_i \cdot g(x)}{w(x)} dx$

 $W(x) = \begin{cases} y_1 & y_2 \\ y_1' & y_2' \end{cases}$

is the Wronskian.

Two important formulae (Short cuts) $0 \int_{0}^{\infty} ax \sin bx dx = \frac{e}{a^{2}+b^{2}} \int_{0}^{\infty} ax \sin x -b \cos x +c$

(2) $\int_{0}^{av} \cos bv = \frac{e^{ax}}{a^{2}t^{2}} \left[a \cos bx - b \sin bx \right]$

Example Salue y"+y=tanx $for \frac{9}{5} = (0^2 + 1)y = 0$ The auxiliary equation is 1 do = C, Cosx +C2 Sinx Here, y=cost, y=sinx let of = A Cosr + B Since - 0 Here, $w(x) = \left| \frac{\partial}{\partial y}, \frac{\partial}{\partial z} \right|$ |W(x)| = |Sinx| = |Sinx| = |Sinx| = |Sinx|

$$A = -\int \frac{g_2 \cdot g_3}{w(x)} dx$$

$$A = -\int \frac{g_{inx} \cdot t_{anx}}{w(x)} \cdot dx$$

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$$= -\int \frac{f_{inx}}{g_{inx}} dx$$

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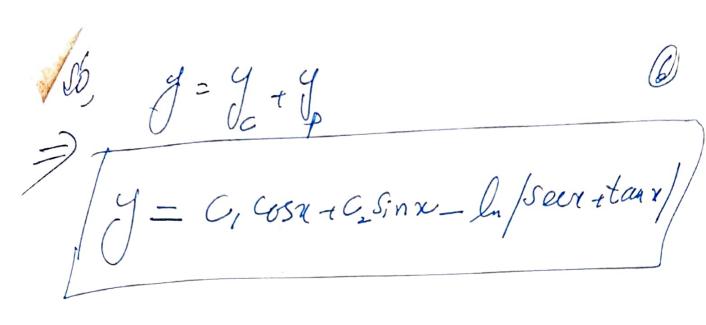
$$= -\int (\frac{f_{inx}}{g_{inx}} - \frac{f_{inx}}{g_{inx}}) dx$$

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A = - (ln/Seex + taux)) + Sinx

 $B = + \int \frac{J_1 \cdot g(x)}{w(x)} dx$ B = S Corn. taux. In = Scope. Sinx du = Sinudu = - Cospe /B=-65n) Using values of A and Bin eq (Yp = [-In/Secr-tann/+ Sins] Cosn + (- 652). Sinze y = -lu/sur + tann/. com + Sinn Cosn — Sinn Cosn Ty=-h/secretain/



Example
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$$A = -\int \frac{g_2 \cdot g(x)}{w(x)} dx$$

$$A = -\int \frac{S_{inx} \cdot S_{ii} \cdot x}{w(x)} dx$$

$$A = -\int \frac{S_{inx} \cdot \frac{1}{cosn}}{cosn} dx$$

$$A = -\int \frac{G_{inx} \cdot \frac{1}{cosn}}{cosn} d$$

using values of A and B in Col Jo= (-Seen) Gorx + ln/Seer+tanx/sinx Ty = -1+ ln/Secx+baux/.Cinx 929 th Ty = C, Cosn eC, Sinx - 1+ In / Seex + tan x/. Sinx

Example = 3 Solve (D+1)y = Secx.tann2 = G, Gosy +C, Sinx B = H Gery + B Sinx W(x) = / $A = x - \tan x$ B = ln/Secx/