REGLA PARA $y_{g/H} = c_1 y_1 + c_2 y_2 + \dots + c_n y_n$

EDOL(n)ccH.

$e^{m_i x}$ $m \in \mathbb{R}$

x^n $n \in \mathbb{E}^+$

$\cos(bx)$

$\operatorname{sen}(bx)$ $b \in \mathbb{R}$

EDOL (2) CC NH.

EDOL (1) CV NH.

$$\frac{dy}{dx} + p(x)\cdot y = q(x)$$

$$y = C_1 e^{-\int p(x)dx} + e^{-\int p(x)dx} \int e^{\int p(x)dx} q(x)dx$$

g/NH. $y_{g/NH} = y_{g/H} + y_{p/q}$

$$\boxed{\frac{dy}{dx} + p(x)y = 0 \qquad y_{g/H} = C_1 e^{-\int p(x)dx}}$$

$$y_{g/NH} = \left(C_1 + \int e^{\int p(x)dx} q(x)dx\right) e^{-\int p(x)dx}$$

$$y_{g/NH} = A(x)\, e^{-\int p(x)dx}$$

$$\frac{d^2y}{dx^2} + a_1 \frac{dy}{dx} + a_2 y = 0$$

$$y_{g/H} = C_1 y_1 + C_2 y_2$$

$$\frac{d^2y}{dx^2} + a_1 \frac{dy}{dx} + a_2 y = Q(x)$$

$$y_{g/NH} = A(x) y_1 + B(x) y_2$$

$$\frac{dy}{dx} = A(x) y_1' + B(x) y_2' + \underbrace{\boxed{A'(x) y_1 + B'(x) y_2}}_{=0}$$

$$\frac{dy}{dx} = A(x) y_1' + B(x) y_2' + (0)$$

$$\frac{d^2y}{dx^2} = A(x) y_1'' + B(x) y_2'' + \boxed{A'(x) y_1' + B'(x) y_2'} = Q(x)$$

$$\frac{d^2y}{dx^2} = A(x) y_1'' + B(x) y_2'' + Q(x).$$

$$\frac{d^2y}{dx^2} + a_1\frac{dy}{dx} + a_2 y = Q(x)$$

$$\frac{d^2y}{dx^2} + a_1\frac{dy}{dx} + a_2 y = 0$$

$$\left[A(x)y_1'' + B(x)y_2'' + Q(x)\right] + a_1\left[A(x)y_1' + B(x)y_2' + (0)\right] +$$

$$+ a_2\left[A(x)y_1 + B(x)y_2\right] = Q(x)$$

$$A(x)\Big[\underbrace{y_1'' + a_1 y_1' + a_2 y_1}_{=0}\Big] + B(x)\Big[\underbrace{y_2'' + a_1 y_2' + a_2 y_2}_{=0}\Big] + Q(x) = Q(x)$$

$$0 \equiv 0$$

H

$$A'(x)\,y_1 + B'(x)\,y_2 = 0$$
$$A'(x)\,y_1' + B'(x)\,y_2' = Q(x)$$

$$\begin{bmatrix} y_1 & y_2 \\ y_1' & y_2' \end{bmatrix}\begin{bmatrix} A'(x) \\ B'(x) \end{bmatrix} = \begin{bmatrix} 0 \\ Q(x) \end{bmatrix}$$

$$\begin{bmatrix} A'(x) \\ B'(x) \end{bmatrix} = \begin{bmatrix} 0 \\ Q(x) \end{bmatrix}\begin{bmatrix} y_1 & y_2 \\ y_1' & y_2' \end{bmatrix}^{-1}$$

$$\left[\begin{array}{l} A'(x) = \dfrac{\begin{vmatrix} 0 & y_2 \\ Q & y_2' \end{vmatrix}}{\begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix}} \\[2em] B'(x) = \dfrac{\begin{vmatrix} y_1 & 0 \\ y_1' & Q \end{vmatrix}}{\begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix}} \end{array}\right.$$

MÉTODO DE LOS COEFICIENTES VARIABLES

$$\frac{d^2y}{dx^2} + 3\frac{dy}{dx} = e^x \qquad \text{EDOL}(2)\text{cc NH.}$$

$$\boxed{\begin{array}{l} \dfrac{d^2y}{dx^2} + 3\dfrac{dy}{dx} = 0 \\ m^2 + 3m = 0 \\ (m+3)m = 0 \end{array} \left\{ \begin{array}{l} m_1 = 0 \\ m_2 = -3 \end{array} \right. \\ y_{g/H} = c_1 + c_2 e^{-3x}}$$

$$y_{g/NH} = A(x) + B(x)e^{-3x}$$

$$\begin{bmatrix} 1 & e^{-3x} \\ 0 & -3e^{-3x} \end{bmatrix} \begin{bmatrix} A'(x) \\ B'(x) \end{bmatrix} = \begin{bmatrix} 0 \\ e^x \end{bmatrix} \leftarrow$$

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$$A'(x) = \frac{\begin{vmatrix} 0 & e^{-3x} \\ e^x & -3e^{-3x} \end{vmatrix}}{\begin{vmatrix} 1 & e^{-3x} \\ 0 & -3e^{-3x} \end{vmatrix}} = \frac{-e^x e^{-3x}}{-3e^{-3x}} \Rightarrow \frac{1}{3}e^x$$

$$\boxed{A'(x) = \frac{1}{3}e^x} \longrightarrow \underline{A(x) = \frac{1}{3}\int e^x dx + c_1}$$

$$B'(x) = \frac{\begin{vmatrix} 1 & 0 \\ 0 & e^x \end{vmatrix}}{-3e^{-3x}} \Rightarrow -\frac{e^x}{3e^{-3x}} \Rightarrow -\frac{1}{3}e^{4x}$$

$$\boxed{B'(x) = -\frac{1}{3}e^{4x}} \qquad \underline{B(x) = -\frac{1}{3}\int e^{4x} dx + c_2}$$

$$A(x) = \frac{1}{3}e^x + c_1 \qquad B(x) = -\frac{1}{12}e^{4x} + c_2$$

$$y_{g/NH} = \left(\frac{1}{3}e^x + c_1\right) + \left(-\frac{1}{12}e^{4x} + c_2\right)e^{-3x}$$

$$y = \underbrace{c_1 + c_2 e^{-3x}}_{g/H} + \underbrace{\left(\frac{1}{3}e^x - \frac{1}{12}e^x\right)}_{y_{P/Q}}$$

$$\boxed{y = c_1 + c_2 e^{-3x} + \frac{1}{4}e^x}$$

$$W \quad \begin{bmatrix} y_1 & y_2 & y_3 \\ y_1' & y_2' & y_3' \\ y_1'' & y_2'' & y_3'' \end{bmatrix} \begin{bmatrix} A'(x) \\ B'(x) \\ D'(x) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ Q(x) \end{bmatrix}$$

$$A'(x) = \frac{\begin{vmatrix} 0 & y_2 & y_3 \\ 0 & y_2' & y_3' \\ Q(x) & y_2'' & y_3'' \end{vmatrix}}{|W|}$$

$$B'(x) = \frac{\begin{vmatrix} y_1 & 0 & y_3 \\ y_1' & 0 & y_3' \\ y_1'' & Q(x) & y_3'' \end{vmatrix}}{|W|}$$

$$D'(x) = \frac{\begin{vmatrix} y_1 & y_2 & 0 \\ y_1' & y_2' & 0 \\ y_1'' & y_2'' & Q(x) \end{vmatrix}}{|W|}.$$

$$\left[e^{At}\right] \qquad \dot{\bar{x}} = A\bar{x}$$

$$\frac{d}{dt}e^{At} = A \times e^{At}$$

$$\left[e^{At}\right] \times \left[e^{At}\right]^{-1} = I.$$

$$\left[e^{At}\right]^{-1} = \left[e^{A(-t)}\right]$$