EDO(1)NL

M. VARIABLES SEPARABLES
M. COEFICIENTES HOMOGÉNEOS
M. EXACTA.
M. FACTOR INTEGRANTE

EDO(1) L CV NH.

$$\frac{dy}{dx} + P(x)\,y = q(x)$$

$$a_0(x)\frac{dy}{dx} + a_1(x)\,y = Q(x)$$

$$\frac{dy}{dx} + \frac{a_1(x)}{a_0(x)}\,y = \frac{Q(x)}{a_0(x)}$$

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

EDO(2) L CV NH:

$$\frac{dy}{dx} + p(x)\, y = q(x) \qquad \text{No hom.}$$

$$\frac{dy}{dx} + p(x)\, y = 0 \qquad \text{homogenea asociada}$$

$$\boxed{y_{g/nh} = y_{g/h_{A}} + y_{p/Q}.}$$

$SG \Rightarrow \quad y = c_1 e^{3x} + 8x^2 \quad y_{p/q}$

$y = c_1 e^{3x} \Rightarrow c_1 = \frac{y}{e^{3x}}$

$\frac{dy}{dx} = 3c_1 e^{3x} \Rightarrow c_1 = \frac{\frac{dy}{dx}}{3e^{3x}}$

$\frac{\frac{dy}{dx}}{3e^{3x}} = \frac{y}{e^{3x}} \Rightarrow \frac{dy}{dx} = 3y$

$\boxed{\frac{dy}{dx} - 3y = 0}$ $\quad y_p = 8x^2$

EDO(1)LCC H_n. $\quad \frac{dy}{dx} = 16x$

$(16x) - 3(8x^2) = Q.$

$\frac{dy}{dx} - 3y = -24x^2 + 16x$

EDO(1)LCC NH.

$y = c_1 e^{3x} + 8x^2$

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

$$\boxed{\frac{dy}{dx} + p(x)\,y = 0}$$

$$y_{g/nh} = y_{g/h} + y_{p/q}$$

$$\frac{dy}{dx} = -p(x)\,y$$

$$\frac{dy}{y} = -p(x)\,dx$$

$$\int \frac{dy}{y} = -\int p(x)\,dx$$

$$\ln y + c_1 = \left[-\int p(x)\,dx\right] + c_2$$

$$\ln y + (c_1 - c_2) = -\int p(x)\,dx$$

$$\ln y - \ln(c) = -\int p(x)\,dx$$

$$\ln\left(\frac{y}{c}\right) = -\int p(x)\,dx$$

$$\frac{y}{c} = e^{-\int p(x)\,dx}$$

Variables Separables.

$$y = c\,e^{-\int p(x)\,dx}$$

$$\frac{dy}{dx} + p(x)\,y = 0$$

$$\frac{dy}{dx} + p(x)y = 0$$

$$M(x,y) + N(x,y)\frac{dy}{dx} = 0$$

$$M(x,y) = p(x)y \qquad N(x,y) = 1$$

$$\frac{\partial M}{\partial y} = p(x) \qquad \frac{\partial N}{\partial x} = 0$$

NO ES EXACTA.

$$\frac{df}{f} = \left(\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}\right)dx$$

$$\frac{df}{f} = \left(\frac{p(x) - 0}{1}\right)dx$$

$$\frac{df}{f} = p(x)\,dx$$

$$\int \frac{df}{f} = \int p(x)\,dx$$

$$\ln f = \int p(x)\,dx$$

$$f = e^{\int p(x)dx}$$

$$e^{\int p(x)dx}\frac{dy}{dx} + e^{\int p(x)dx}p(x)y = 0$$

$$MM = e^{\int p(x)dx}p(x)y$$

$$NN = e^{\int p(x)dx}$$

$$\frac{\partial MM}{\partial y} = e^{\int p(x)dx}p(x)$$

EXACTA

$$\frac{\partial NN}{\partial x} = e^{\int p(x)dx}p(x)$$

$$\frac{d}{dx}\left(e^{\int p(x)dx}y\right) = 0$$

$$e^{\int p(x)dx}\frac{dy}{dx} + e^{\int p(x)dx}p(x)y = 0$$

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

$$y = Ce^{-\int p(x)dx}$$

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

$$e^{\int p\,dx}\left(\frac{dy}{dx} + p(x)\,y\right) = e^{\int p(x)dx}\,q(x)$$

$$\frac{d}{dx}\left(e^{\int p(x)dx}\,y\right) = e^{\int p(x)dx}\,q(x)$$

$$d\left(e^{\int p(x)dx}\,y\right) = e^{\int p(x)dx}\,q(x)\,dx$$

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

$$y_{g/nh} = y_{g/h} + y_{p/q.}$$

$$\frac{dy}{dx} + \overset{p(x)}{2x}\, y = 2x e^{-x^2}$$

$$e^{\int p(x)\,dx} = e^{2\int x\,dx}$$

$$F.I. = e^{x^2}$$

$$e^{x^2} y = C + \int \cancel{e^{x^2}} \left(2x \cancel{e^{-x^2}}\right) dx$$

$$e^{x^2} y = C + \int 2x \, dx$$

$$= C + x^2$$

$$\boxed{y = C_1 e^{-x^2} + x^2 e^{-x^2}}$$

$$P = -\frac{1}{x\, L(x)}$$

$$FI = e^{\int P\, dx}$$

$$-\int \frac{dx}{x\, L(x)} \Rightarrow -\int \frac{\left(\frac{dx}{x}\right)}{L(x)} = -\int \frac{du}{u}$$

$u = L(x)$

$du = \frac{dx}{x}$

$$= -L\,u$$

$$= -L(Lx)$$

$$FI = e^{\int p,\, dx} = e^{-L(Lx)}$$

$$= \frac{1}{Lx}$$