$$F\big(x, y(x), \underbrace{y', y'', \dots}\big) = 0$$

Ecuación. Diferencial. Ordinarias.

función incógnita

Var. independiente.

EDO(n) { no Lineales; Lineales — { coef. var; coef. ctes } { Homog.; No Homog. }

derivada de mayor orden

EDO(n) $\Longleftrightarrow$ soluciones $y(x)$ { 1 Sol. gral.; ∞ Sol. partic.; # Sol. singulares (NO LINEALES). }

EDO(n) L. $\Longleftrightarrow$ Sol. Gral.

$$y(x) = c_1 y_1 + c_2 y_2 + \dots + c_n y_n$$

Condiciones (n) { iniciales; frontera. }

$$\begin{vmatrix} y_1 & y_2 & y_3 \\ y_1' & y_2' & y_3' \\ y'' & y_2'' & y_2'' \end{vmatrix} \neq 0.$$

soluciones particulares (fundamentales).

$$y_g = \underbrace{c_1 x^2 + c_2 x + c_3}_{y_{g/H}} + \underbrace{4e^{2x} + 5\cos(2x)}_{y_{P/Q}}$$

EDO (3) LCC NH.

$$y_{g/H} = c_1 x^2 + c_2 x + c_3$$

$$m^3 = 0$$

$$\underbrace{\text{CASO II = Raíces Iguales}}$$

$$m_1 = 0 \quad m_2 = 0 \quad m_3 = 0$$

$$\frac{d^3y}{dx^3} = 0$$

$$\frac{d^3y}{dx^3} = Q(x)$$

$$y_p = 4e^{2x} + 5\cos(2x)$$

$$\frac{dy}{dx} = 8e^{2x} - 10\operatorname{sen}(2x)$$

$$\frac{d^2y}{dx^2} = 16e^{2x} - 20\cos(2x)$$

$$\boxed{\frac{d^3y}{dx^3} = 32e^{2x} + 40\operatorname{sen}(2x)}$$

$$y(0) = 3$$
$$y'(0) = -2$$
$$y''(0) = 6$$

$$y = c_1 x^2 + c_2 x + c_3 + 4e^{2x} + 5\cos(2x)$$

$$y(0) = (0) + (0) + \boxed{c_3 + 4 + 5 = 3}$$

$$c_3 = 3 - 9 \Rightarrow -6$$

$$y' = 2c_1 x + c_2 + (0) + 8e^{2x} - 10\operatorname{sen}(2x)$$

$$y'(0) = (0) + \boxed{c_2 + 8 - (0) = -2}$$

$$c_2 = -10$$

$$y''(0) = 6$$

$$y'' = \boxed{2c_1 + (0) + 16 - 20 = 6}$$

$$c_1 = \frac{10}{2} = 5$$

$$\boxed{y_p = 5x^2 - 10x - 6 + 4e^{2x} + 5\cos(2x)}$$

$$y''' - 6y'' = 2e^{2x}$$

$$Q = 2e^{2x}$$

$$(D^3 - 6D^2)y = 0$$

$$D^2(D-6)y = 0$$

$$y_h = c_1 + c_2 x + c_3 e^{6x}$$

$$D^2(D-6)y = 2e^{2x}$$

$$D^2(D-6)\underbrace{(D-2)}_{A}y = 0$$

$$y_g = c_1 + c_2 x + c_3 e^{6x} + Ae^{2x}$$

$$y_{p/Q} = Ae^{2x}$$

$$y' = 2Ae^{2x}$$

$$y'' = 4Ae^{2x}$$

$$y''' = 8Ae^{2x}$$

$$8Ae^{2x} - 6(4Ae^{2x}) = 2e^{2x}$$

$$-16Ae^{2x} = 2e^{2x}$$

$$-16A = 2$$

$$A = -\frac{1}{8}$$

$$\boxed{y_g = c_1 + c_2 x + c_3 e^{6x} - \frac{1}{8}e^{2x}}$$

TEMA 1. EDO(1)NL

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

M. Variables Separables
M. Coef. Homogeneos
M. Ecuación EXACTA.
M. FACTOR Integrante.

$$M(x,y) + N(x,y)\,y' = 0$$

$$P(x)\,Q(y) + R(x)\cdot S(y)\,y' = 0$$

$$\boxed{SG = \int \frac{P(x)}{R(x)}\,dx + \int \frac{S(y)}{Q(y)}\,dy = C_1}$$

$$M(x,y) + N(x,y)\,y' = 0$$

$$M(\lambda x, \lambda y) = \lambda^m M(x,y)$$

$$N(\lambda x, \lambda y) = \lambda^n N(x,y) \qquad m = n$$

$$y(x) = x \cdot u(x) \qquad dy = x\,du + u$$

$$u(x) = \frac{y(x)}{x}$$

Variables Separables

$$M(x,y) + N(x,y)\, y' = 0$$

$$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x} \quad \text{EXACTA.}$$

$$SG \Rightarrow \int M\,dx + \int \left[N - \frac{\partial}{\partial y}\int M\,dx \right] dy = C_1$$

$$\int N\,dy + \int \left[M - \frac{\partial}{\partial x}\int N\,dy \right] dx = C_1$$

$$M(x,y) + N(x,y)\, y' = 0 \quad \text{NO EXACTA}$$

$$FI \cdot M + FI \cdot N \, y' = 0 \quad \text{EXACTA.}$$

$$\frac{\partial}{\partial y}\left(FI \cdot M\right) = \frac{\partial}{\partial x}\left(FI \cdot N\right)$$

$FI\left(x^2+y\right)$

$$\frac{\partial FI}{\partial y} \cdot M + FI \frac{\partial M}{\partial y} = \frac{\partial FI}{\partial x} N + FI \frac{\partial N}{\partial x}$$

$FI(x)$

$$FI \frac{\partial M}{\partial y} = \frac{d}{dx} FI \cdot N + FI \cdot \frac{\partial N}{\partial x}$$

$$\frac{dFI}{dx} \cdot N = - FI \frac{\partial N}{\partial x} + FI \frac{\partial M}{\partial y}$$

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

$FI(y)$

$$\frac{dFI}{FI} = \left(\frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{M}\right) dy$$