

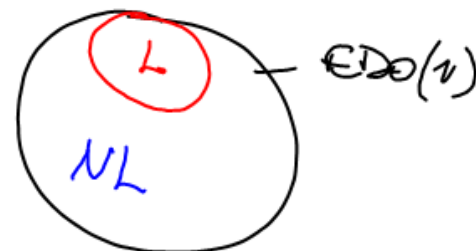
CAP. 1 (2ª parte) NO LINEAL DE PRIMER ORDEN

$$F(x, y, \frac{dy}{dx}) = 0 \quad \text{EDO}(1)$$

$$\frac{dy}{dx} = G(x, y) \quad \text{EDO}(1)$$

$$\frac{dy}{dx} = \underbrace{-p(x)y + q(x)}_{\text{CAP 2}} \quad \text{EDO}(1) \quad \text{L}$$

toda EDO(1) que no cumpla
que $G(x, y) \Rightarrow -p(x)y + q(x)$
será no lineal



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

Métodos No Lineales

Variables Separables
Exacta
Factor Integrante
Coeficientes Homogéneos.

$$\frac{dy}{dx} = -\frac{M(x, y)}{N(x, y)} \Rightarrow N(x, y) \frac{dy}{dx} = -M(x, y)$$

$$\boxed{M(x, y) + N(x, y) \frac{dy}{dx} = 0} \quad \text{forma General EDO(1) NL}$$

$$\underbrace{\left[p(x)y - q(x) \right]}_{M(x, y)} + \underbrace{\left[1 \right]}_{N(x, y)} \frac{dy}{dx} = 0$$

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

Método de Variables Separables

$$P(x) \cdot Q(y) + R(x) \cdot S(y) \frac{dy}{dx} = 0$$

multiplicar $\frac{1}{R(x)Q(y)}$

$$\frac{\cancel{P(x)}\cancel{Q(y)}}{\cancel{R(x)}\cancel{Q(y)}} + \frac{\cancel{R(x)}S(y)}{\cancel{R(x)}\cancel{Q(y)}} \frac{dy}{dx} = 0$$

$$\frac{P(x)}{R(x)} + \frac{S(y)}{Q(y)} \frac{dy}{dx} = 0$$

$$\frac{P(x)}{R(x)} \cdot dx + \frac{S(y)}{Q(y)} dy = 0$$

SOLUCIÓN
GENERAL

$$\int \frac{P(x)}{R(x)} \cdot dx + \int \frac{S(y)}{Q(y)} dy = C,$$

$$F(x, y) = C_1$$

$$\underbrace{(y^2 + xy^2)}_N \frac{dy}{dx} + \underbrace{x^2 - yx^2}_M = 0$$

$$x^2(1-y) + (x+1)y^2 \frac{dy}{dx} = 0$$

$$P = x^2 \quad Q = (1-y)$$

$$R = (x+1) \quad S = y^2$$

$$\frac{x^2}{x+1} + \frac{y^2}{1-y} \frac{dy}{dx} = 0$$

$$\int \frac{x^2}{x+1} dx + \int \frac{y^2}{1-y} dy = C$$

$$\begin{array}{r} x^2 \overline{) x+1} \\ -x^2-x \\ \hline 0-x \\ +x+1 \\ \hline 0+1 \end{array}$$

$$\int \left(x-1 + \frac{1}{x+1} \right) dx + \int \left(-y-1 + \frac{1}{1-y} \right) dy = C$$

$$\begin{array}{r} y^2 \overline{) -y+1} \\ -y^2+y-1 \\ \hline 0+y \end{array}$$

$$\text{SolucionGeneral} := -\frac{1}{2}x^2 + x - \ln(1+x) + y + \frac{1}{2}y^2 + \ln(-1+y) = C_1$$

$$\frac{x^2}{2} - x + \ln(x+1) - \frac{y^2}{2} - y + \ln(1-y) = C_1$$