

Ecuación No Lineal 1º Orden

Método de la Ecuación Exacta.

$$\text{SG: } x^3y + 4x^2y^2 - 6xy^3 = C_1 \quad f(x,y) = C_1$$

$$\text{EDO(1)}_{NL} \quad \frac{\partial F}{\partial x} + \frac{\partial F}{\partial y} \cdot \frac{dy}{dx} = 0$$

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

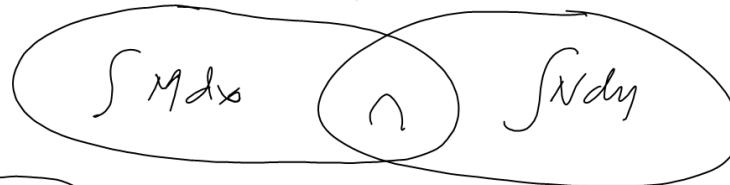
$$(3x^2y + 8xy^2 - 6y^3) + (x^3 + 8x^2y - 18xy^2) \cdot \frac{dy}{dx} = 0$$

$$M(x,y) \quad \frac{\partial^2 F}{\partial x \partial y} \equiv \frac{\partial^2 F}{\partial y \partial x} \quad N(x,y)$$

$$\frac{\partial M}{\partial y} \Rightarrow 3x^2 + 16xy - 18y^2 \quad \left. \begin{array}{l} \text{EDO(1)}_{NL} \\ \text{ES} \end{array} \right\}$$

$$\frac{\partial N}{\partial x} \Rightarrow 3x^2 + 16xy - 18y^2 \quad \left. \begin{array}{l} \text{EXACTA.} \end{array} \right\}$$

$$(3x^2y + 8xy^2 - 6y^3) + (x^3 + 8x^2y - 18xy^2) \frac{dy}{dx} = 0$$



$(SG) \Rightarrow \int M dx + \int N dy = C,$

$$\int M dx + \int N dy - (\int M dx \cap \int N dy) = C,$$

$$\int M dx = \int (3x^2y + 8xy^2 - 6y^3) dx$$

$$= 3y \int x^2 dx + 8y^2 \int x dx - 6y^3 \int dx$$

$$= 3y \left(\frac{x^3}{3} \right) + 8y^2 \left(\frac{x^2}{2} \right) - 6y^3 x$$

$$= x^3 y + 4x^2 y^2 - 6x y^3$$

$$\int N dy = \int (x^3 + 8x^2 y - 18xy^2) dy$$

$$= x^3 \int dy + 8x^2 \int y dy - 18x \int y^2 dy$$

$$= x^3 y + 8x^2 \left(\frac{y^2}{2} \right) - 18x \left(\frac{y^3}{3} \right)$$

$$\int M dx \cap \int N dy = x^3 y + 4x^2 y^2 - 6x y^3$$

A Venn diagram with three overlapping circles. The left circle is labeled $\int M dx$. The middle circle contains the expression $x^3 y + 4x^2 y^2 - 6x y^3$. The right circle is labeled $\int N dy$. Arrows point from each term in the expression to its respective circle.

$$x^3 y + 4x^2 y^2 - 6x y^3 = C,$$