ECUACIÓN NO LINEAL DE 1er ORDEN

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

MSV

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

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

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

$\pm$EDO(1)NL $\longrightarrow$ ES DENOMINADA EXACTA

(SG) $\rightarrow$ $x^2y^3 + x^2y^4 + x^3y^2 = C_1$

$F(x,y) = C_1$

$\frac{d}{dx}F(x,y) = 0$

$\frac{\partial F}{\partial x} + \frac{\partial F}{\partial y}\cdot\frac{dy}{dx} = 0$

T. Schwartz

$\frac{\partial^2 F}{\partial x \partial y} = \frac{\partial^2 F}{\partial y \partial x}$

$\left(2xy^3 + 2xy^4 + 3x^2y^2\right) + \left(3x^2y^2 + 4x^2y^3 + 2x^3y\right)\frac{dy}{dx} = 0$

EDO(1)NL

$M(x,y) = \frac{\partial F}{\partial x}$ $\qquad$ $N(x,y) = \frac{\partial F}{\partial y}$

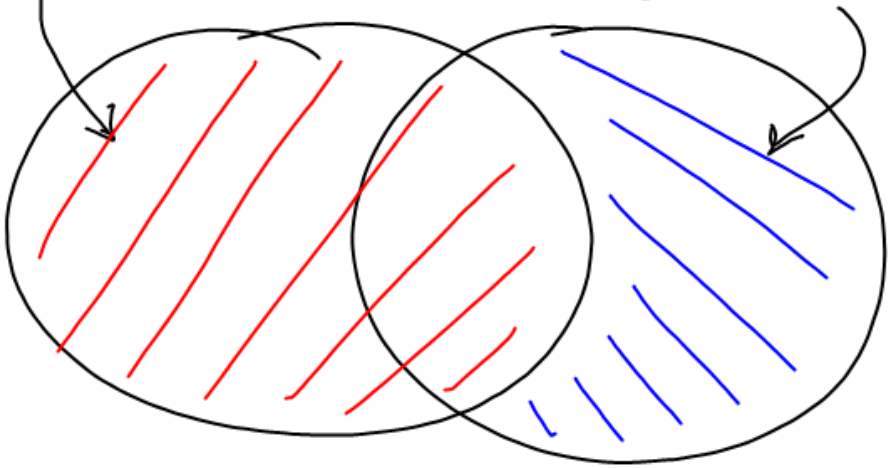
$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

$\frac{\partial M}{\partial y} = 6xy^2 + 8xy^3 + 6x^2y$ $\qquad$ $\frac{\partial N}{\partial x} = 6xy^2 + 8xy^3 + 6x^2y$

$\pm$EXACTA

$$A \cup B = (A+B) - (A \cap B)$$

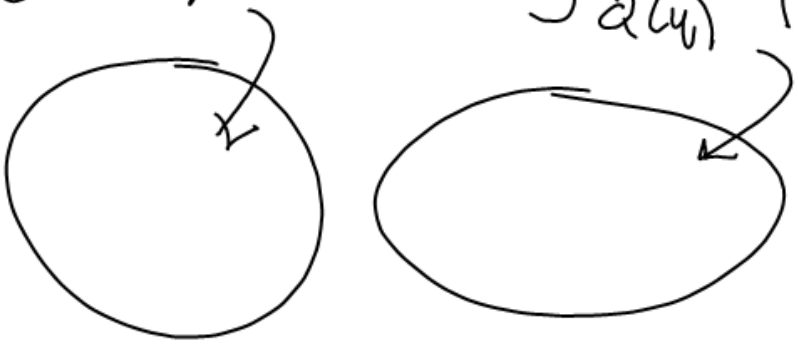
$\int M\,dx$ $\int N\,dy$



SG $\Rightarrow \left[\int M\,dx\right] \cup \left[\int N\,dy\right] = C_1$

SG

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



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

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

EDO

$$(2xy^3+2xy^4+3x^2y^2)+(3x^2y^2+4x^2y^3+2x^3y)\frac{dy}{dx}=0$$

$$\int M\,dx = 2y^3\int x\,dx + 2y^4\int x\,dx + 3y^2\int x^2\,dx$$

$$= 2y^3\cdot\frac{x^2}{2} + 2y^4\cdot\frac{x^2}{2} + 3y^2\cdot\frac{x^3}{3}$$

$$\int M\,dx = x^2y^3 + x^2y^4 + x^3y^2$$

$$\frac{\partial}{\partial y}\int M\,dx = 3x^2y^2+4x^2y^3+2x^3y$$

$$N-\frac{\partial}{\partial y}\int M\,dx = (3x^2y^2+4x^2y^3+2x^3y)-(3x^2y^2+4x^2y^3+2x^3y)$$

$$\left[N-\frac{\partial}{\partial y}\int M\,dx\right]=0$$

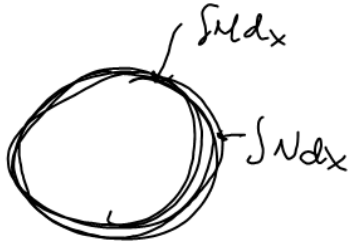
SG

$$x^2y^3+x^2y^4+x^3y^2=C_1$$

$$\int N\,dy = 3x^2\int y^2\,dy + 4x^2\int y^3\,dy + 2x^3\int y\,dy$$

$$= 3x^2\cdot\frac{y^3}{3} + 4x^2\cdot\frac{y^4}{4} + 2x^3\cdot\frac{y^2}{2}$$

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



$$(2xy^3+2xy^4+3x^2y^2)+(3x^2y^2+4x^2y^3+2x^3y)\frac{dy}{dx}=0$$

$$x(2y^3+2y^4+3xy^2)+x(3xy^2+4xy^3+2x^2y)\frac{dy}{dx}=0$$

$$(2y^3+2y^4+3xy^2)+(3xy^2+4xy^3+2x^2y)\frac{dy}{dx}=0$$

$$\frac{\partial M}{\partial y}=6y^2+8y^3+6xy$$

NO EXACTA $\quad\frac{\partial N}{\partial x}=3y^2+4y^3+4xy$

$$y(2xy^2+2xy^3+3x^2y)+y(3x^2y+4x^2y^2+2x^3)\frac{dy}{dx}=0$$

$$(2xy^2+2xy^3+3x^2y)+(3x^2y+4x^2y^2+2x^3)\frac{dy}{dx}=0$$

$$\frac{\partial M}{\partial y}=4xy+6xy^2+3x$$

NO EXACTA $\quad\frac{\partial N}{\partial x}=6xy+8xy^2+6x^2$