EDO(1) NL.

Método Ecuación Exacta.

SG(NL) $\quad F(x,y) = C_1$

EDO(1)NL $\quad \dfrac{\partial F}{\partial x} + \dfrac{\partial F}{\partial y} \cdot \dfrac{dy}{dx} = 0 \qquad \dfrac{\partial^2 F}{\partial x \partial y} = \dfrac{\partial^2 F}{\partial y \partial x}$

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

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

$$x^2y^4 - 6x^3y^3 + 8x^4y^2 = C_1 \quad SG(NL)$$

$$\frac{\partial F}{\partial x} = 2xy^4 - 18x^2y^3 + 32x^3y^2$$

$$\frac{\partial F}{\partial y} = 4x^2y^3 - 18x^3y^2 + 16x^4y$$

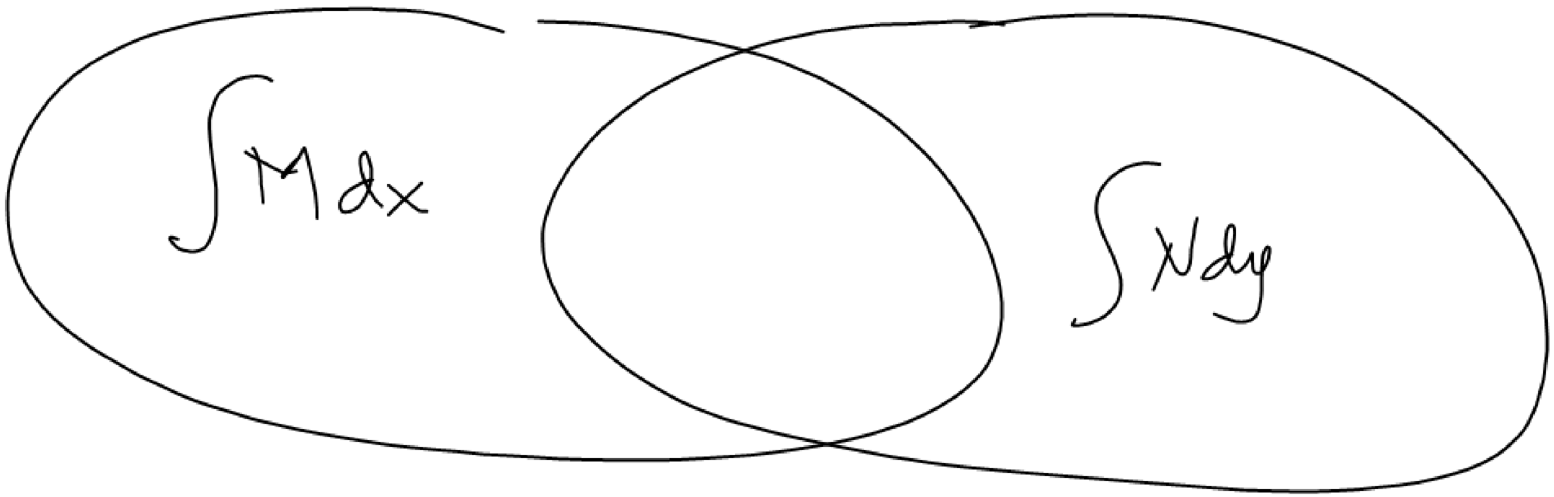
$$\underbrace{\left(2xy^4 - 18x^2y^3 + 32x^3y^2\right)}_{M} + \overbrace{\left(4x^2y^3 - 18x^3y^2 + 16x^4y\right)}^{N} \cdot \frac{dy}{dx} = 0$$

EDO(1)NL

$$\frac{\partial M}{\partial y} = 8xy^3 - 54x^2y^2 + 64x^3y$$

EXACTA

$$\frac{\partial N}{\partial x} = 8xy^3 - 54x^2y^2 + 64x^3y$$



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

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

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

M. Factor Integrante.

$$\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x} \quad (\text{NO EXACTA}).$$

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

$$FI \cdot M(x,y) + FI \cdot N(x,y)\frac{dy}{dx} = 0 \quad \text{EXACTA}.$$

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

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

$FI(x)$

$$FI(x)\cdot\frac{\partial M}{\partial y} + M\cdot(0) = FI(x)\frac{\partial N}{\partial x} + N\frac{dFI}{dx}$$

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

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

$$\int\frac{dFI}{FI} = \int\left[\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}\right]dx$$

$$\ln(FI) = \int\left[\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}\right]dx$$

$$\boxed{FI = e^{\int\left[\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}\right]dx}}$$

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

$FI(y)$

$$FI\frac{\partial M}{\partial y}+M\frac{dFI}{dy}=FI\frac{\partial N}{\partial x}+N\cdot(0)$$

$$\int\frac{dFI}{FI}=\int\left[\frac{\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}}{M}\right]dy$$

$$(x+y^2)\,dx - 2yx \cdot dy = 0 \qquad y(1)=3$$

$$\underbrace{(x+y^2)}_{M} - \underbrace{2yx}_{N} \cdot \frac{dy}{dx} = 0$$

$$\frac{\partial M}{\partial y} = 2y \qquad \frac{\partial N}{\partial x} = -2y \quad \text{NO EXACTA}$$

$$\frac{dFI(x)}{FI(x)} = \left[\frac{2y-(-2y)}{-2yx}\right] dx$$

$$= \frac{4y}{-2yx}\,dx$$

$$\frac{dFI}{FI} = -\frac{2}{x}\,dx$$

$$\int \frac{dFI}{FI} = -2\int \frac{dx}{x}$$

$$L(FI) = -2\,Lx$$

$$L(FI) = L\left(\frac{1}{x^2}\right)$$

$$FI = \frac{1}{x^2}$$

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

$$\underbrace{\left(\frac{1}{x} + \frac{y^2}{x^2}\right)}_{MM} - \underbrace{\frac{2y}{x}}_{NN}\,\frac{dy}{dx} = 0$$

$$\frac{\partial MM}{\partial y} = \frac{2y}{x^2} \qquad \frac{\partial NN}{\partial x} = +\frac{2y}{x^2} \quad \text{EXACTA.}$$

$$\int MM\,dx = \int \left(\frac{1}{x} + \frac{y^2}{x^2}\right) dx$$

$$= \int \frac{dx}{x} + y^2 \int \frac{dx}{x^2}$$

$$= Lx + y^2\left(\frac{x^{-1}}{-1}\right)$$

$$\int MM\,dx = Lx - \frac{y^2}{x}$$

$$SG = \int MM\,dx + \int\left(NN - \frac{\partial}{\partial y}\int MM\,dx\right) dy = C_1$$

$$= Lx - \frac{y^2}{2} + \int\left(-\frac{2y}{x} + \frac{2y}{x}\right) dy = C_1$$

$$\boxed{Lx - \frac{y^2}{x} = C_1}$$

$$L1 - \frac{3^2}{1} = C_1$$

$$Lx - \frac{y^2}{x} = (L1 - 9) \quad \underline{SP}$$