EDO(1)NL - Método EXACTA

$$x^2y^5+8x^3y^4-6x^4y^3+10x^5y^2=C_1$$

SG

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

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

$$\left(2xy^5+24x^2y^4-24x^3y^3+50x^4y^2\right)+$$

EDO(1)NL
$$\left(5x^2y^4+32x^3y^3-18x^4y^2+20x^5y\right)\frac{dy}{dx}=0$$

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

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

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

$$\left(2xy^5+24x^2y^4-24x^3y^3+50x^4y^2\right)+$$

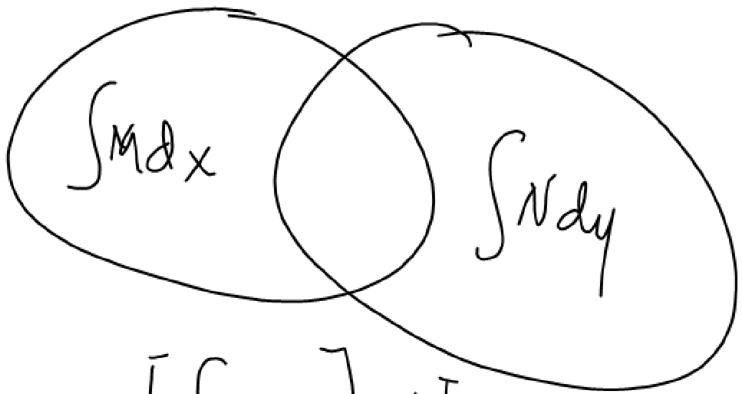
$$+\left(5x^2y^4+32x^3y^3-18x^4y^2+20x^5y\right)\cdot\frac{dy}{dx}=0$$

$$\frac{\partial M}{\partial y}=10xy^4+96x^2y^3-72x^3y^2+100x^4y$$

$$\frac{\partial N}{\partial x}=10xy^4+96x^2y^3-72x^3y^2+100x^4y$$

EDO(1)NL es exacta.

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



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

$$\int M\,dx+\int N\,dy-\left[\int M\,dx\right]\cap\left[\int N\,dy\right]=0$$

$$SG_1 \Rightarrow \int M\,dx+\int\left[N-\frac{\partial}{\partial y}\int M\,dx\right], y = C_1$$

$$SG_2 \Rightarrow \int N\,dy+\int\left[M-\frac{\partial}{\partial x}\int N\,dy\right], x = C_1$$

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

$$SQ = \int M dx + \int \left(N - \frac{\partial}{\partial y} \int M dx \right) dy = C_1$$

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

$$\left(2xy^5+24x^2y^4-24x^3y^3+50x^4y^2\right)+$$
$$+\left(5x^2y^4+32x^3y^3-18x^4y^2+20x^5y\right)\frac{dy}{dx}=0$$

$$\int M\,dx=\int\left(2xy^5+24x^2y^4-24x^3y^3+50x^4y^2\right)dx$$

$$\int M\,dx=2y^5\int x\,dx+24y^4\int x^2dx-24y^3\int x^3dx+50y^2\int x^4dx$$
$$=y^5\left(x^2\right)+24\left(\frac{x^3}{3}\right)y^4-24y^3\left(\frac{x^4}{4}\right)+50y^2\left(\frac{x^5}{5}\right)$$
$$\int M\,dx=x^2y^5+8x^3y^4-6x^4y^3+10x^5y^2$$

$$\begin{cases}\dfrac{\partial}{\partial y}\int M\,dx=5x^2y^4+32x^3y^3-18x^4y^2+20x^5y\\ -N\quad=-5x^2y^4-32x^3y^3+18x^4y^2-20x^5y\end{cases}$$
$$0\qquad 0\qquad 0\qquad 0$$

$$x^2y^5+8x^3y^4-6x^4y^3+10x^5y^2=C_1\quad SG$$

$$\int N\,dy=5x^2\int y^4dy+32x^3\int y^3dy-18x^4\int y^2dy+20x^5\int y\,dy$$
$$=5x^2\left(\frac{y^5}{5}\right)+32x^3\left(\frac{y^4}{4}\right)-18x^4\left(\frac{y^3}{3}\right)+20x^5\left(\frac{y^2}{2}\right)$$
$$x^2y^5+8x^3y^4-6x^4y^3+10x^5y^2=C_1\quad SG$$

$$\left(2xy^5+24x^2y^4-24x^3y^3+50x^4y^2\right)+$$

$$+\left(5x^2y^4+32x^3y^3-18x^4y^2+20x^5y\right)\frac{dy}{dx}=0$$

$$x\left(2y^5+24xy^4-24x^2y^3+50x^3y^2\right)+$$

$$+x\left(5xy^4+32x^2y^3-18x^3y^2+20x^4y\right)\frac{dy}{dx}=0$$

$$\left(2y^5+24xy^4-24x^2y^3+50x^3y^2\right)+$$

MM

$$+\left(5xy^4+32x^2y^3-18x^3y^2+20x^4y\right)\frac{dy}{dx}=0$$

NN

$$\frac{\partial MM}{\partial y}=10y^4+96xy^3-72x^2y^2+100x^3y$$

$$\frac{\partial NN}{\partial x}=5y^4+64xy^3-54x^2y^2+80x^3y$$

$$\frac{\left(2xy^5 + 24x^2y^4 - 24x^3y^3 + 50x^4y^2\right) + \\ + \left(5x^2y^4 + 32x^3y^3 - 18x^4y^2 + 20x^5y\right)\cdot\frac{dy}{dx}}{y\left(2xy^4 + 24x^2y^3 - 24x^3y^2 + 50x^4y\right) + \\ + y\left(5x^2y^3 + 32x^3y^2 - 18x^4y + 20x^5\right)\cdot\frac{dy}{dx} = 0}$$

$$\frac{dy}{dx} + p(x)\,y = q(x)$$

EDO(1) L. CV. NH

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

$$\int \frac{dy}{y} = -\int p(x)\,dx$$

$$\ln y + C_1 = -\int p(x)\,dx + C_2$$

$$\ln y = -\int p(x)\,dx + (C_2 - C_1)$$

$$y = e^{(C_2 - C_1)} \cdot e^{-\int p(x)\,dx}$$

$$y = C_{10}\,e^{-\int p(x)\,dx}$$

SG

$$\frac{dy}{dx} + p(x)y = 0$$

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

$$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x} \qquad \frac{\partial M}{\partial y} = p(x) \qquad \frac{\partial N}{\partial x} = 0$$

$$M + N \cdot y' = 0$$

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

$$FI \cdot M + FI \cdot N \cdot \frac{dy}{dx} = 0$$

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

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

Si $FI = f(x)$

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

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

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

Aplicando Lineal.

$$\frac{dFI(x)}{FI(x)} = \left(\frac{p(x) - (0)}{1} \right) dx$$

$$\int \frac{dFI(x)}{FI(x)} = \int p(x)\,dx$$

$$\ln FI(x) = \int p(x)\,dx$$

$$FI(x) = e^{\int p(x)\,dx}$$

$$\frac{dy}{dx} + p(x) y = 0$$

$$e^{\int p(x)dx} \cdot \frac{dy}{dx} + e^{\int p(x)dx} p(x) y = 0$$

$$\frac{d}{dx} \left(e^{\int p(x)dx} y \right) = 0$$

$$\left(\int e^{\int p(x)dx} y \right) = C_1$$

$$Sg = e^{\int p(x)} y = C_1$$

$$\boxed{y = C_1 e^{-\int p(x)dx}}$$

$$\frac{dy}{dx} + p(x)y = q(x)$$

$$\frac{d}{dx}\left(e^{\int p(x)dx} y\right) = e^{\int p(x)dx} q(x)$$

$$d\left(e^{\int p(x)dx} y\right) = e^{\int p(x)dx} q(x)\,dx$$

$$y = c_1 e^{-\int p(x)dx} + e^{-\int p(x)dx}\int e^{\int p(x)dx} q(x)\,dx$$