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

Método de la EDO Exacta.

$$x^3y^2 - 6x^2y^3 + 8xy^4 = C.$$

Solución general

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

EDO(1)NL

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

$$\Big(\underbrace{3x^2y^2 - 12xy^3 + 8y^4}_{M(x,y)}\Big) + \Big(\underbrace{2x^3y - 18x^2y^2 + 32xy^3}_{N(x,y)}\Big)\frac{dy}{dx} = 0$$

$$\frac{\partial^2 F}{\partial x \partial y} = \frac{\partial^2 F}{\partial y \partial x} \quad \therefore \text{ EXACTA.}$$

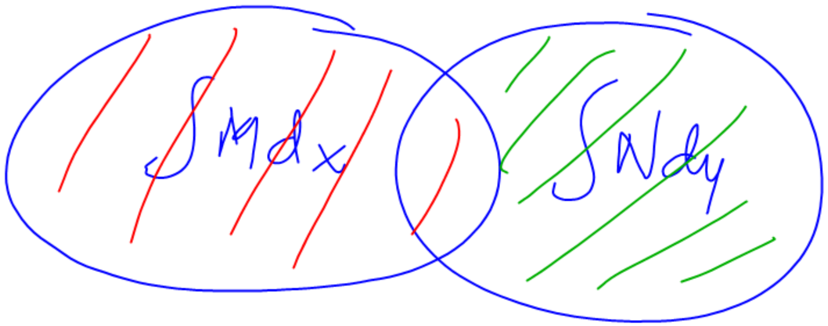
$$\frac{\partial M}{\partial y} = 6x^2y - 36xy^2 + 32y^3$$

$$\frac{\partial N}{\partial x} = 6x^2y - 36xy^2 + 32y^3$$

$$\underbrace{\left(3x^2y^2 - 12xy^3 + 8y^4\right)}_{M(x,y)} + \underbrace{\left(2x^3y - 18x^2y^2 + 32xy^3\right)}_{N(x,y)}\frac{dy}{dx} = 0$$

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

SG



$$\underbrace{\left(\frac{x}{\sqrt{x^2+y^2}}+\frac{1}{x}+\frac{1}{y}\right)}_{M}+\underbrace{\left(\frac{y}{\sqrt{x^2+y^2}}+\frac{1}{y}-\frac{x}{y^2}\right)}_{N}\frac{dy}{dx}=0$$

$$\frac{\partial M}{\partial y}=x\frac{d}{dy}\left(\frac{1}{\sqrt{x^2+y^2}}\right)+(0)+\frac{d}{dy}y^{-1})$$

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

$$=-\frac{1}{2}x\left(x^2+y^2\right)^{-3/2}(2y)-y^{-2}$$

$$\left.\begin{aligned}\frac{\partial M}{\partial y}&=-\frac{xy}{(x^2+y^2)^{3/2}}-\frac{1}{y^2}\\ \frac{\partial N}{\partial x}&=-y\cdot x\left(x^2+y^2\right)^{-3/2}-\frac{1}{y^2}\end{aligned}\right\}\text{EXACTA.}$$

$$x^3y^2 - 6x^2y^3 + 8xy^4 = C.$$ Solución general

$$\underbrace{\left(3x^2y^2 - 12xy^3 + 8y^4\right)}_{M(x,y)} + \underbrace{\left(2x^3y - 18x^2y^2 + 32xy^3\right)}_{N(x,y)}\frac{dy}{dx} = 0$$

$$\frac{1}{y}\left(3x^2y^2 - 12xy^3 + 8y^4\right) + \frac{1}{y}\left(2x^3y - 18x^2y^2 + 32xy^3\right)\frac{dy}{dx} = 0$$

$$\left(\underbrace{3x^2y - 12xy^2 + 8y^3}_{MM}\right) + \left(\underbrace{2x^3 - 18x^2y + 32xy^2}_{NN}\right)\frac{dy}{dx} = 0$$

$$\frac{\partial MM}{\partial y} = 3x^2 - 24xy + 24y^2$$

$$\frac{\partial NN}{\partial x} = 6x^2 - 36xy + 32y^2$$

$\therefore$ NO ES EXACTA.

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

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

$$\frac{\partial(\mu M)}{\partial y} = \frac{\partial(\mu N)}{\partial x} \quad \text{EXACTA.}$$

$$\mu(x,y)\frac{\partial M}{\partial y} + M\frac{\partial \mu}{\partial y} = \mu(x,y)\frac{\partial N}{\partial x} + N\frac{\partial \mu}{\partial x}$$

$$\mu(x)\frac{\partial M}{\partial y} = \mu(x)\frac{\partial N}{\partial x} + N\frac{d\mu}{dx}$$

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

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

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

$$\int\frac{d\mu}{\mu} = \int[\quad]dx$$

$$\ln\mu = \int[\quad]dx$$

$$\mu = e^{\int[\quad]dx}$$

$$\int\frac{d\mu}{\mu} = \int\left[\frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{M}\right]dy \qquad \mu = e^{\int[\quad]dy}$$

$$\frac{dy}{dx} + p(x)\,y = q(x) \quad \text{EDO(1)L CV NH.}$$

$$\frac{dy}{dx} + p(x)\,y = 0 \quad \text{H. asociada}$$

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

$$dy = -p(x)\,y\,dx$$

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

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

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

$$Ly = (C_2 - C_1)\left(-\int p(x)\,dx\right)$$

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

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

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

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

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

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

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

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

$$\left(\frac{dy}{dx} + p(x)\,y\right) = 0 \quad \text{NO ES EXACTA}$$

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

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

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

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

$$e^{\int p(x)\,dx}\,y + C_1 = \left[\int e^{\int p(x)\,dx}\,q(x)\,dx\right] + C_2$$

$$\boxed{y = C e^{-\int p(x)\,dx}} + e^{-\int p(x)\,dx}\left[\int e^{\int p(x)\,dx}\,q(x)\,dx\right]$$