SOLUCIÓN GENERAL

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

EDO (1) NL

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

$$\frac{\partial}{\partial x}\left(f(x,y)\right) = 0$$

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

$$\left(2xy^3 + 32x^3y^2 + 18x^2y^5\right) + \left(3x^2y^2 + 16x^4y + 30x^3y^4\right)\cdot\frac{dy}{dx} = 0$$

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

$$M \Rightarrow \frac{\partial f}{\partial x} \qquad N \Rightarrow \frac{\partial f}{\partial y}$$

Teorema Schwarz.

$$\begin{tikzcd}
 & F(x,y) \arrow[dl] \arrow[dr] & \\
\frac{\partial F}{\partial x} \arrow[d] & & \frac{\partial F}{\partial y} \arrow[d] \\
\frac{\partial^2 F}{\partial x \partial y} \arrow[r, phantom, "="] & & \frac{\partial^2 F}{\partial y \partial x}
\end{tikzcd}$$

$$\frac{\partial M}{\partial y} \Rightarrow \frac{\partial^2 F}{\partial x \partial y}$$

$$\frac{\partial N}{\partial x} \Rightarrow \frac{\partial^2 F}{\partial y \partial x}$$

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

$$\underbrace{2xy^3+32x^3y^2+18x^2y^5}_{M}+\underbrace{\left(3x^2y^2+16x^4y+30x^3y^4\right)}_{N}\frac{dy}{dx}=0$$

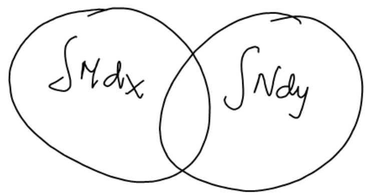
$$\frac{\partial M}{\partial y}=6xy^2+64x^3y+90x^2y^4$$

$$\frac{\partial N}{\partial x}=6xy^2+64x^3y+90x^2y^4$$

$$\frac{\partial M}{\partial y}\equiv\frac{\partial N}{\partial x}$$ entonces la EDO(1)NL es EXACTA

$$\frac{\partial f}{\partial x} \Longleftrightarrow M \qquad \int M\,dx = f$$

$$\frac{\partial f}{\partial y} \Longleftrightarrow N \qquad \int N\,dy = f$$



$$SG \Rightarrow \int M\,dx \cup \int N\,dy = C_1$$

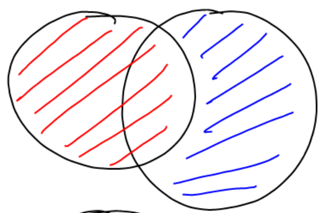
$$\int \frac{P}{R}\,dx + \int \frac{S}{Q}\,dy = C_1$$

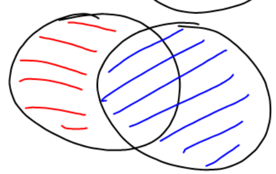
$$\Rightarrow \int M\,dx + \int N\,dy - \left[\int M\,dx \cap \int N\,dy\right] = C_1$$

SG

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

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





$$(2xy^3+32x^3y^2+18x^2y^5)+(3y^2x^2+16x^4y+30x^3y^4)\cdot\frac{dy}{dx}=0$$

$$\int M\,dx = 2y^3\int x\,dx + 32y^2\int x^3\,dx + 18y^5\int x^2\,dx$$

$$= 2y^3\left(\frac{x^2}{2}\right)+32y^2\left(\frac{x^4}{4}\right]+18y^5\left(\frac{x^3}{3}\right)$$

$$\int M\,dx = x^2y^3+8x^4y^2+6x^3y^5$$

$$\frac{\partial}{\partial y}\int M\,dx = 3x^2y^2+16x^4y+30x^3y^4$$

$$\left[N-\frac{\partial}{\partial y}\int M\,dx\right]=(3y^2x^2+16x^4y+30x^3y^4)-(3x^2y^2+16x^4y+30x^3y^4)$$

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

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

$$\int M\,dx = C_1$$

$$\boxed{x^2y^3+8x^4y^2+6x^3y^5=C_1}$$

$$\left(2xy^3+32x^3y^2+18x^2y^5\right)+\left(3x^2y^2+16x^4y+30x^3y^4\right)\frac{dy}{dx}=0$$

$$y\left(2xy^2+32x^3y+18x^2y^4\right)+y\left(3x^2y+16x^4+30x^3y^3\right)\frac{dy}{dx}=0$$

$$\underbrace{2xy^2+32x^3y+18x^2y^4}_{MM}+\underbrace{\left(3x^2y+16x^4+30x^3y^3\right)}_{NN}\frac{dy}{dx}=0$$

$$\frac{\partial MM}{\partial y}=4xy+32x^3+72x^2y^3$$

$$\frac{\partial NN}{\partial x}=6xy+64x^3+90x^2y^3$$

$$\frac{\partial MM}{\partial y}\neq\frac{\partial NN}{\partial x}$$ entonces EDO(1)NL

es NO-EXACTA.

$$(2xy^3+32x^3y^2+18x^2y^5)+(3x^2y^2+16x^4y+30x^3y^4)\frac{dy}{dx}=0$$

$$x(2y^3+32x^2y^2+18xy^5)+x(3xy^2+16x^3y+30x^2y^4)\frac{dy}{dx}=0$$

$$\underbrace{2y^3+32x^2y^2+18xy^5}_{MMM}+\underbrace{(3xy^2+16x^3y+30x^2y^4)}_{NNN}\frac{dy}{dx}=0$$

$$\frac{\partial MMM}{\partial y}=6y^2+64x^2y+90xy^4$$

$$\frac{\partial NNN}{\partial x}=3y^2+48x^2y+60xy^4$$

$$\frac{\partial MMM}{\partial y}\neq\frac{\partial NNN}{\partial x}$$ entonces NO-EXACTA.

$$2xy^3 + 32x^3y^2 + 18x^2y^5 + \left(3x^2y^2 + 16x^4y + 30x^3y^4\right)\frac{dy}{dx} = 0$$

$$xy\left(2y^2 + 32x^2y + 18xy^4\right) + xy\left(3xy + 16x^3 + 30x^2y^3\right)\frac{dy}{dx} = 0$$

$$\underbrace{2y^2 + 32x^2y + 18xy^4}_{MMMM} + \underbrace{\left(3xy + 16x^3 + 30x^2y^3\right)}_{NNNN}\frac{dy}{dx} = 0$$

$$\frac{\partial MMMM}{\partial y} = 4y + 32x^2 + 72xy^3$$

$$\frac{\partial NNNN}{\partial x} = 3y + 48x^2 + 60xy^3$$

$$\frac{\partial MMMM}{\partial y} \neq \frac{\partial NNNN}{\partial x}$$ es NO-EXACTA

231. $$\left(\frac{1}{y}\operatorname{sen}\frac{x}{y}-\frac{y}{x^2}\cos\frac{y}{x}+1\right)dx+$$
$$+\left(\frac{1}{x}\cos\frac{y}{x}-\frac{x}{y^2}\operatorname{sen}\frac{x}{y}+\frac{1}{y^2}\right)dy=$$

$$x \quad \operatorname{Sen}\left(\frac{y}{x}\right)-\cos\left(\frac{x}{y}\right) \quad -\frac{1}{y} = C_1$$