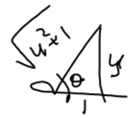
93. $(xy^2 - y^2 + x - 1)\,dx + (x^2y - 2xy + x^2 + 2y - 2x + 2)\,dy = 0.$

$$(x-1)(y^2+1) + (x^2-2x+2)(y+1)\frac{dy}{dx} = 0$$

$P(x) \quad Q(y) \quad R(x) \quad S(y)$

Solución General

$$\int \frac{(x-1)}{x^2-2x+2}\,dx + \int \frac{(y+1)}{y^2+1}\,dy = C_1$$



$u = x^2-2x+2$

$du = 2x-2$

$\sqrt{y^2+1} = \sec\theta$

$y^2+1 = \sec^2\theta$

$y = \tan\theta$

$dy = \sec^2\theta\, d\theta.$

$$\frac{1}{2}\int \frac{2(x-1)}{x^2-2x+2}\,dx + \frac{1}{2}\int \frac{2y}{y^2+1}\,dy + \int \frac{dy}{y^2+1} = C_1.$$

$$\frac{1}{2}L(x^2-2x+2) + \frac{1}{2}L(y^2+1) + \int \frac{\sec^2\theta\, d\theta}{\sec^2\theta} = C_1$$

$$L(x^2-2x+2)^{1/2} + L(y^2+1)^{1/2} + \arg\tan(y) = C_1$$

$$L\left((x^2-2x+2)(y^2+1)\right)^{1/2} + \arg\tan(y) = C_1$$

$$\frac{1}{2}L\left((x^2-2x+2)(y^2+1)\right) = C_1 - \arg\tan(y)$$

$$L\left((x^2-2x+2)(y^2+1)\right) = 2\left(C_1 - \arg\tan(y)\right)$$

$$(x^2-2x+2)(y^2+1) = e^{2(C_1 - \arg\tan(y))}$$

$$(x^2-2x+2)(y^2+1) - e^{2C_1}e^{-2\arg\tan(y)} = 0$$

Método de la Ecuación Diferencial Exacta.

$$x^4y^3 + 8x^2y^4 + 6y^3 + 8x = C_1 \qquad SG$$

$$\Rightarrow F(x,y) = C_1 \qquad \frac{\partial^2 F}{\partial x \partial y} = \frac{\partial^2 F}{\partial y \partial x}$$

$$\frac{\partial}{\partial x} F(x,y) = \frac{\partial}{\partial x}(C_1)$$

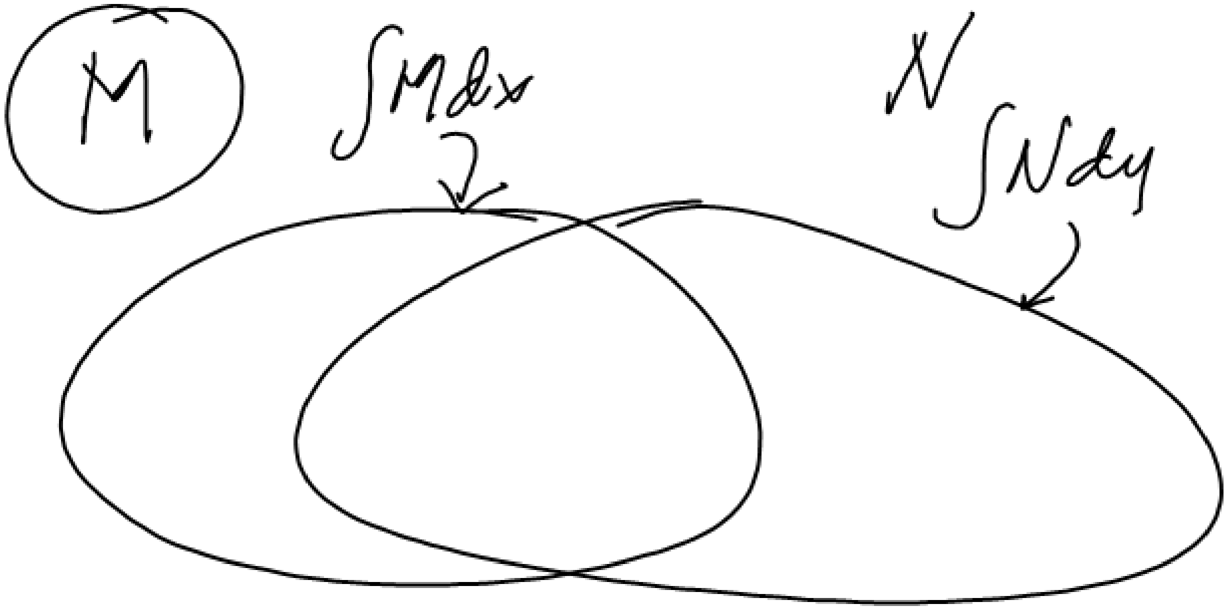
$$\frac{\partial}{\partial x} F(x,y) + \frac{\partial}{\partial y} F(x,y) \frac{dy}{dx} = 0$$

$$\underbrace{(4x^3y^3 + 16xy^4 + 0 + 8)}_{M} + \underbrace{(3x^4y^2 + 32x^2y^3 + 18y^2 + (0))}_{N} \frac{dy}{dx} = 0$$

EDO(1)NL

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

$$\left.\begin{aligned} \frac{\partial M}{\partial y} &\Rightarrow 12x^3y^2 + 64xy^3 \\ \frac{\partial N}{\partial x} &\Rightarrow 12x^3y^2 + 64xy^3 \end{aligned}\right\} \text{EXACTA.}$$



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

Solución general

$$\int M\,dx + \int N\,dy - \left(\left(\int M\,dx\right) \cap \left(\int N\,dy\right)\right) = C_1$$

$$\left(4x^3y^3 + 16xy^4 + 8\right) + \left(3x^4y^2 + 32x^2y^3 + 18y^2\right)\frac{dy}{dx} = 0$$

$$\int M\,dx = 4y^3\int x^3\,dx + 16y^4\int x\,dx + 8\int dx$$

$$= 4y^3\left(\frac{x^4}{4}\right) + 16y^4\left[\frac{x^2}{2}\right] + 8x$$

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

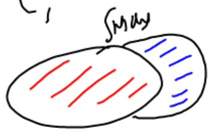
$$\int N\,dy = 3x^4\int y^2\,dy + 32x^2\int y^3\,dy + 18\int y^2\,dy$$

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

$$\int N\,dy = x^4y^3 + 8x^2y^4 + 6y^3$$

$8x \quad x^4y^3 + 8x^2y^4 \quad 6y^3$

SOL GRAL $\quad 8x + x^4y^3 + 8x^2y^4 + 6y^3 = C_1$



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

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

220. $\left(3x^2 \operatorname{tg} y - \frac{2y^3}{x^3}\right) dx + \left(x^3 \sec^2 y + 4y^3 + \frac{3y^2}{x^2}\right) dy = 0.$

$$M = 3x^2\tan(y) - \frac{2y^3}{x^3}$$

$$N = x^3\sec^2(y) + 4y^3 + \frac{3y^2}{x^2}$$

$$\frac{\partial M}{\partial y} = 3x^2\sec^2(y) - \frac{6y^2}{x^3}$$

$$\frac{\partial N}{\partial x} = 3x^2\sec^2(y) - \frac{6y^2}{x^3}$$

EXACTA

$$\int M dx = 3\tan(y)\int x^2 dx - 2y^3\int \frac{dx}{x^3}$$

$$\int M dx = x^3\tan(y) + \frac{y^3}{x^2}$$

$$\frac{\partial}{\partial y}\int M dx = x^3\sec^2(y) + \frac{3y^2}{x^2}$$

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

$$\left[N - \frac{\partial}{\partial y}\int M dx\right] = 4y^3$$

$$\int [\quad] dy = 4\int y^3 dy$$

$$= y^4$$

Sol gral $= \boxed{x^3\tan(y) + \frac{y^3}{x^2} + y^4 = C_1}$