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

VS. $$P(x)Q(y) + R(x)S(y)\frac{dy}{dx} = 0$$

SG $$\int \frac{P(x)}{R(x)}dx + \int \frac{S(y)}{Q(y)}dy = C_1$$

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

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

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

$$F(x,y) = C_1 \longrightarrow \text{EDO}(1)\ \underline{\underline{NL}}$$

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

$$\underbrace{\left(5x^4y^4 + 4x^3y^5 + 2xy^3\right)}_{M(x,y)} +$$

$$\underbrace{\left(4x^5y^3 + 5x^4y^4 + 3x^2y^2\right)}_{N(x,y)}\cdot\frac{dy}{dx} = 0$$

$$\left.\begin{aligned}\frac{\partial M}{\partial y} &= 20x^4y^3 + 20x^3y^4 + 6xy^2\\ \frac{\partial N}{\partial x} &= 20x^4y^3 + 20x^3y^4 + 6xy^2\end{aligned}\right\}\ \text{EXACTA.}$$

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

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

$$\underbrace{\left(5x^3y^2 + 4x^2y^3 + 2y\right)}_{MM} + \underbrace{\left(4x^4y + 5x^3y^2 + 3x\right)}_{NN}\frac{dy}{dx} = 0$$

$$\frac{\partial MM}{\partial y} = 10x^3y + 12x^2y^2 + 2 \qquad \frac{\partial MM}{\partial y} \neq \frac{\partial NN}{\partial x}$$

$$\frac{\partial NN}{\partial x} = 16x^3y + 15x^2y^2 + 3$$

$\therefore$ NO-EXACTA.

$$M(x,y) + N(x,y)\frac{dy}{dx} = 0 \quad \text{NO-EXACTA}$$

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

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

$$\frac{\partial}{\partial y}\left(FM\right) = \frac{\partial}{\partial x}\left(FN\right) \quad \text{EXACTA.}$$

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

$$F(x,y) \Rightarrow F(x)$$

$$F\frac{\partial M}{\partial y} = \frac{dF}{dx}N + F\frac{\partial N}{\partial x}$$

$$\left(F\frac{\partial N}{\partial x} - F\frac{\partial M}{\partial y}\right) + N\frac{dF}{dx} = 0$$

$$F\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right) + N\frac{dF}{dx} = 0$$

$$\left(\frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{N}\right)dx + \frac{dF}{F} = 0$$

$$\int\left(g(x)\right)dx + \int\frac{dF}{F} = C_1$$

EDO(1) L cc H.

$$\frac{dy}{dx} + p(x)y = 0 \qquad y = C_1 e^{-\int p(x)dx}$$

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

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

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

$N(x,y) = 1$

$\frac{\partial N}{\partial x} = 0$ NO EXACTA.

$$\left(\frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{N}\right) \Rightarrow \left(\frac{0 - p(x)}{1}\right)$$

$$-p(x)dx + \frac{dF}{F} = 0$$

$$-\int p(x)dx + \int \frac{dF}{F} = C_1$$ SG Fact. Int.

$$\ln F = C_1 + \int p(x)dx$$

$$F = e^{C_1 + \int p(x)dx}$$

$$F(x) = C_{10} e^{\int p(x)dx}$$

$$F(x) = e^{\int p(x)dx}$$ FACTOR INTEGRANTE

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

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

$$\frac{\partial MM}{\partial y} = e^{\int p(x)dx} p(x) \qquad NN = e^{\int p(x)dx}$$

$$\frac{\partial NN}{\partial x} = e^{\int p(x)dx} p(x)$$

EXACTA

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

$$SG \Rightarrow \int NN dy + \int \left[MM - \frac{\partial}{\partial x} \int NN dy \right] dx = C_1$$

$$\int NN\, dy = e^{\int p(x)dx} \int dy \Rightarrow \boxed{e^{\int p(x)dx} y}$$

$$\frac{d}{dx} \int NN dy = e^{\int p(x)dx} p(x) y$$

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

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