# COEFICIENTES HOMOGÉNEOS

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

$$M(\lambda x, \lambda y) = \lambda^m M(x,y)$$

$\lambda \in \mathbb{R}$

$$\boxed{m = n}$$

$$N(\lambda x, \lambda y) = \lambda^n N(x,y)$$

EDO (1) NL es de COEFICIENTES HOMOGÉNEOS.

$$\frac{dy}{dx} = \frac{2xy}{3x^2 - y^2}$$

$$(3x^2 - y^2)\frac{dy}{dx} = 2xy$$

$$-2xy + (3x^2 - y^2)\frac{dy}{dx} = 0$$

$$M(x, y) = -2xy$$

$$M(\lambda x, \lambda y) = -2(\lambda x)(\lambda y) \Rightarrow \lambda^2(-2xy) \quad m = 2$$

$$N(x, y) = 3x^2 - y^2$$

$$N(\lambda x, \lambda y) = 3(\lambda x)^2 - (\lambda y)^2 \Rightarrow 3\lambda^2 x^2 - \lambda^2 y^2$$

$$= \lambda^2(3x^2 - y^2) \quad n = 2$$

$\boxed{m = n}$ COEFICIENTES HOMOGÉNEOS.

$$\boxed{CH} \longrightarrow \boxed{SUST} \longrightarrow \boxed{VS}$$

$$-2xy + (3x^2 - y^2)\frac{dy}{dx} = 0$$

$$y(x) = u(x)\cdot x$$

$$\frac{dy}{dx} = u\cdot(1) + x\frac{du}{dx}$$

$$-2x(ux) + (3x^2 - (ux)^2)\left(u + x\frac{du}{dx}\right) = 0$$

$$-2ux^2 + (3x^2 - u^2x^2)\left(u + x\frac{du}{dx}\right) = 0$$

$$-2ux^2 + 3ux^2 - u^3x^2 + \left(3x^3\frac{du}{dx} - u^2x^3\frac{du}{dx}\right) = 0$$

$$x^2(u - u^3) \quad + x^3(3 - u^2)\frac{du}{dx} = 0$$

$P(x) = x^2 \quad Q(u) = u - u^3$

$R(x) = x^3 \quad S(u) = 3 - u^2$

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

$$\int \frac{x^2}{x^3}dx + \int \frac{3 - u^2}{u - u^3}du = C_1$$

$$\int \frac{dx}{x} + \int \frac{3 - u^2}{u - u^3}du = C_1 \Rightarrow u = \frac{y}{x}$$

$T = u - u^3$

$dT = 1 - 3u^2 du$

$$\int \frac{3 - u^2}{u - u^3}du = \frac{1}{3}\int \frac{9 - 3u^2}{u - u^3}du$$

$$= \frac{1}{3}\int \frac{1 - 3u^2}{u - u^3}du + \frac{8}{3}\int \frac{du}{u - u^3}$$

$$\int \frac{du}{u(1 - u^2)}$$


$\cos(\theta) = \frac{\sqrt{1 - u^2}}{1} \qquad \operatorname{sen}(\theta) = \frac{u}{1}$

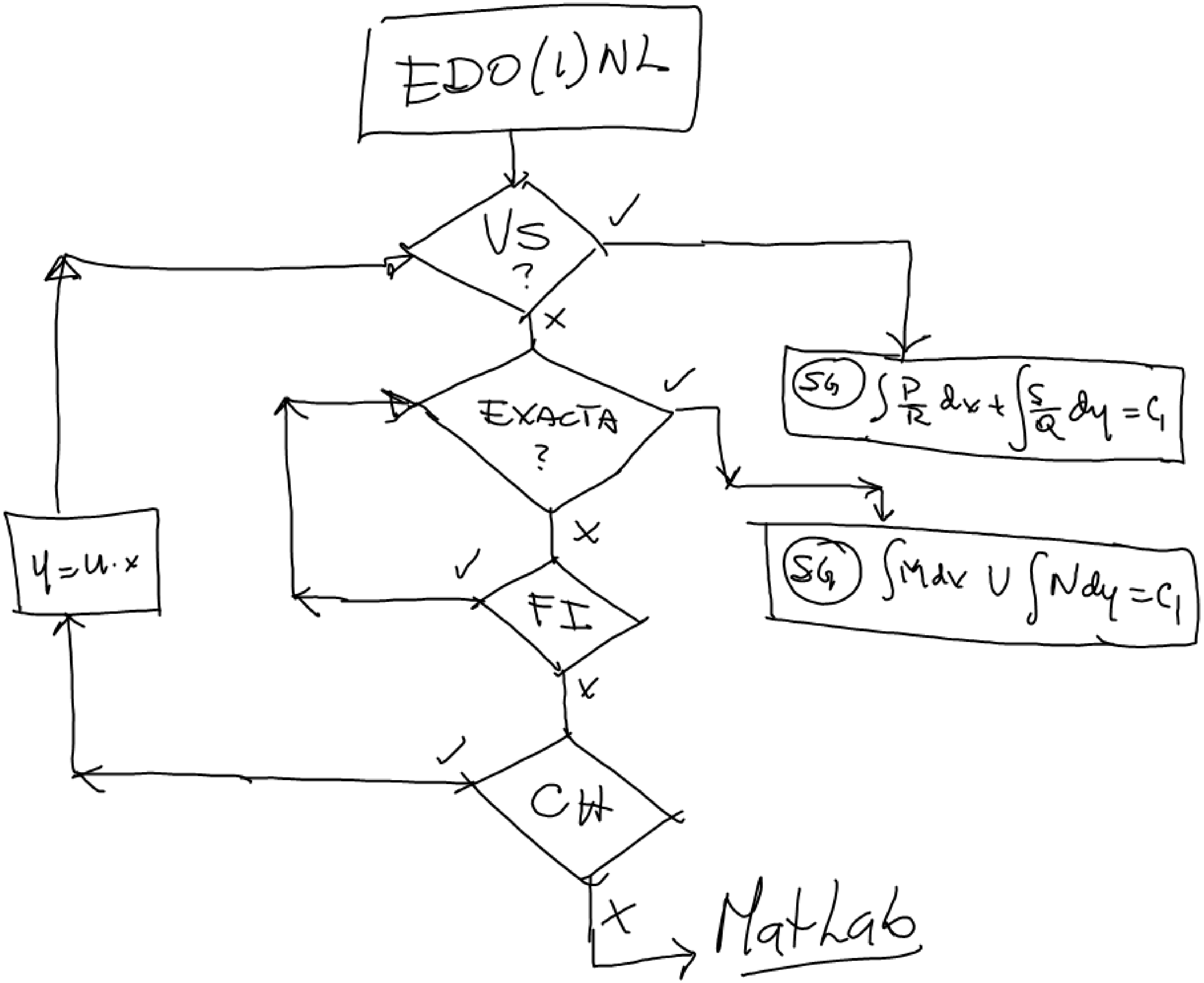
$\cos^2(\theta) = 1 - u^2 \qquad du = \cos(\theta)\,d\theta$

$$\int \frac{\cos(\theta)\,d\theta}{\operatorname{sen}(\theta)\cos^2(\theta)} = \int \frac{d\theta}{\operatorname{sen}(\theta)\cos(\theta)}$$

$$= \frac{1}{2}\int \frac{2\,d\theta}{\frac{1}{2}\operatorname{sen}(2\theta)}$$

$$= \frac{2}{2}\int \csc(2\theta)\,d\theta.$$

$$= -\frac{2}{2}\left(\csc(\theta)\cot(\theta)\right).$$


EDO(1)NL
VS ?
EXACTA ?
FI
CH
y = u · x
SG $\int \frac{P}{R} dx + \int \frac{S}{Q} dy = C_1$
SG $\int M dx \cup \int N dy = C_1$
Matlab

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

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

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

$$N(x,y) = 1 \qquad \frac{\partial N}{\partial x} = 0$$

NO EXACTA

$$\mu \Rightarrow \mu(x)$$

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

EXACTA

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

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

$$\int \frac{d\mu}{\mu} = \int p(x)dx$$

$$\ln \mu = \int p(x)dx$$

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