Método de Coeficientes Homogéneos

$$\boxed{M(x,y) + N(x,y)\frac{dy}{dx} = 0 \quad EDO(1)NL}$$

$$\left.\begin{array}{l} M(\lambda x, \lambda y) = \lambda^m M(x,y) \\ N(\lambda x, \lambda y) = \lambda^n N(x,y) \end{array}\right\} \text{si } m = n$$

entonces la EDO(1)NL será de CH.

Sust. $y(x) = V(x) \cdot x \rightarrow \frac{dy(x)}{dx} = V(x) + x \frac{dV(x)}{dx}$

entonces $\boxed{\text{EDO(1)NL CH}} \rightarrow \boxed{\text{EDO(1)NL VS}}$ siempre.

una vez resuelta entonces

$$V(x) = \frac{y(x)}{x}$$

SOLUCIÓN GENERAL EDO(1)NL.

146. $xy' = y + \sqrt{y^2 - x^2}$.

147. $4x^2 - xy + y^2 + y'(x^2 - xy + 4y^2) = 0$.

$$y + \sqrt{y^2 - x^2} - x\frac{dy}{dx} = 0 \qquad \text{EDO(1)NL}$$

$$M(\lambda x, \lambda y) = \lambda y + \sqrt{(\lambda y)^2 - (\lambda x)^2}$$
$$= \lambda y + \sqrt{\lambda^2 y^2 - \lambda^2 x^2}$$
$$= \lambda y + \sqrt{\lambda^2 (y^2 - x^2)}$$
$$= \lambda y + \sqrt{\lambda^2}\sqrt{y^2 - x^2}$$
$$= \lambda y + \lambda\sqrt{y^2 - x^2}$$
$$= \lambda\left(y + \sqrt{y^2 - x^2}\right) \qquad m = 1$$

$$N(\lambda x, \lambda y) = -\lambda x$$
$$= \lambda(-x) \qquad n = 1$$

$$\left.\begin{matrix} m=1 \\ n=1 \end{matrix}\right\} m = n$$

Coeficientes Homogéneos.

$$y = v \cdot x \qquad \frac{dy}{dx} = v + x\frac{dv}{dx}$$

$$y + \sqrt{y^2 - x^2} - x\frac{dy}{dx} = 0$$

$$vx + \sqrt{(vx)^2 - x^2} - x\left(v + x\frac{dv}{dx}\right) = 0$$

$$\cancel{vx} + \sqrt{v^2x^2 - x^2} - \cancel{xv} - x^2\frac{dv}{dx} = 0$$

$$\sqrt{(v^2-1)x^2} \qquad - x^2\frac{dv}{dx} = 0$$

$$\sqrt{v^2-1}\,\sqrt{x^2} \qquad - x^2\frac{dv}{dx} = 0$$

$$x\sqrt{v^2-1} - x^2\frac{dv}{dx} = 0$$

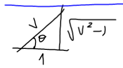
$$x^2\frac{dv}{dx} = x\sqrt{v^2-1}$$

$$\frac{dv}{dx} = \frac{x\sqrt{v^2-1}}{x^2}$$

$$\frac{dv}{dx} = \frac{\sqrt{v^2-1}}{x}$$

$$\frac{dv}{\sqrt{v^2-1}} = \frac{dx}{x}$$

$$\int \frac{dv}{\sqrt{v^2-1}} = \int \frac{dx}{x}$$



$$\sec(\theta) = v$$
$$\tan(\theta) = \sqrt{v^2-1}$$
$$v = \sec(\theta)$$
$$dv = \sec(\theta)\tan(\theta)\,d\theta$$

$$\int \frac{\sec(\theta)\tan(\theta)\,d\theta}{\tan(\theta)} = Lx$$

$$\int \sec(\theta)\,d\theta = Lx$$

$$L\left(\sec(\theta) + \tan\theta\right) = Lx + C_1$$

$$L\left(v + \sqrt{v^2-1}\right) = Lx + LC_1$$

$$\boxed{v + \sqrt{v^2-1} = C_1 x}$$

$$v = \frac{y}{x}$$

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

$$\frac{y}{x} + \sqrt{\frac{y^2}{x^2} - 1} = C_1 x$$

$$\frac{y}{x} + \frac{\sqrt{y^2 - x^2}}{\sqrt{x^2}} = C_1 x$$

$$\frac{y}{x} + \frac{\sqrt{y^2 - x^2}}{x} = C_1 x$$

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$$\boxed{y + \sqrt{y^2 - x^2} = C_1 x^2}$$

$$y + \sqrt{y^2 - x^2} - x\frac{dy}{dx} = 0$$

146. $xy' = y + \sqrt{y^2 - x^2}$.

→ **147.** $4x^2 - xy + y^2 + y'(x^2 - xy + 4y^2) = 0$.

$$4x^2 - xy + y^2 + (x^2 - xy + 4y^2)\frac{dy}{dx} = 0$$

$$M(\lambda x, \lambda y) = 4(\lambda x)^2 - (\lambda x)(\lambda y) + (\lambda y)^2$$

$$= 4\lambda^2 x^2 - \lambda^2 xy + \lambda^2 y^2$$

$$= \lambda^2 (4x^2 - xy + y^2) \quad m = 2$$

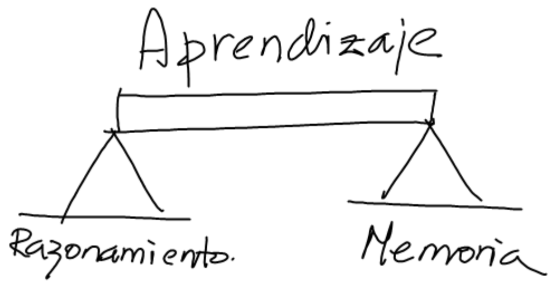
$$N(\lambda x, \lambda y) = (\lambda x)^2 - (\lambda x)(\lambda y) + 4(\lambda y)^2$$

$$= \lambda^2 x^2 - \lambda^2 xy + 4\lambda^2 y^2$$

$$= \lambda^2 (x^2 - xy + 4y^2) \quad n = 2$$

$m = n$

$$y = vx \quad \frac{dy}{dx} = v + x\frac{dv}{dx}$$



$$\int u\,dv = uv - \int v\,du$$

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

$$y = C_1 e^{-\int p\,dx} + e^{-\int p\,dx}\int e^{\int p\,dx}\,q\,dx$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$\frac{\frac{a}{b}}{\frac{c}{d}} = \frac{ad}{cb}$$

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$