Método de Coeficientes Homogéneos.

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

Si

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

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

entonces puedo afirmar que la EDO(1)NL es de C.H.

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

$$M(x,y)=\sqrt{x^2-y^2}+y$$

$$N(x,y)=-x$$

$$M(\lambda x,\lambda y)=\sqrt{(\lambda x)^2-(\lambda y)^2}+(\lambda y)$$

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

$$=\sqrt{\lambda^2(x^2-y^2)}+\lambda y$$

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

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

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

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

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

ES DE COEFICIENTES HOMOGÉNEOS.

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

$$y=u\cdot x \qquad \frac{dy}{dx}=u+x\frac{du}{dx}$$

Siempre llegaremos a Variables Separable.

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

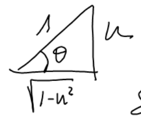
$$\sqrt{x^2-u^2x^2}+\cancel{ux}-\cancel{ux}-x^2\frac{du}{dx}=0$$

$$\sqrt{x^2(1-u^2)}-x^2\frac{du}{dx}=0$$

$$\sqrt{x^2}\sqrt{1-u^2}-x^2\frac{du}{dx}=0$$

$$x\sqrt{1-u^2}-x^2\frac{du}{dx}=0$$

$$\frac{x\,dx}{x^2}-\frac{du}{\sqrt{1-u^2}}=0$$



$$\frac{\sqrt{1-u^2}}{1}=\cos\theta$$

$$\text{sen}\,\theta=\frac{u}{1}$$

$$du=\cos\theta\,d\theta$$

$$\frac{dx}{x}-\frac{du}{\sqrt{1-u^2}}=0$$

$$\int\frac{dx}{x}-\int\frac{du}{\sqrt{1-u^2}}=C_1$$ SOLUCION GENERAL

$$\theta=\text{arg sen}(u)$$

$$Lx-\int\frac{\cancel{\cos\theta}\,d\theta}{\cancel{\cos\theta}}=C_1$$

$$Lx-\int d\theta=C_1$$

$$y=ux$$

$$Lx-\theta=C_1$$

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

$$Lx-\text{arg sen}(u)=C_1$$

$$\boxed{Lx-\text{arg sen}\left(\frac{y}{x}\right)=C_1}$$

$$\frac{du}{dx} = -\frac{u(-1+u^2)}{x(-3+u^2)}$$

$$du = -\frac{dx}{x} \cdot \frac{u(-1+u^2)}{(-3+u^2)}$$

$$\frac{du \cdot (-3+u^2)}{u(-1+u^2)} + \frac{dx}{x} = 0$$

$$\int \frac{(-3+u^2)}{u(-1+u^2)} du + \int \frac{dx}{x} = C_1.$$