EDO (1) NL

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

MVS.

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

$$P(x)\,Q(y)\,dx + R(x)\,S(y)\,dy = 0$$

$$\frac{1}{R(x)\,Q(y)}$$

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

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

Sg

Coeficientes Homogeneos

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

MCH.

sust $x \Rightarrow \lambda x \quad y \Rightarrow \lambda y$

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

$$2x\left(x^2+y^2\right)\frac{dy}{dx}=y\left(y^2+2x^2\right)$$

$$\underbrace{-y\left(y^2+2x^2\right)}_{M(x,y)}+\underbrace{2x\left(x^2+y^2\right)}_{N(x,y)}\frac{dy}{dx}=0$$

$$M(\lambda x,\lambda y)=-(\lambda y)\left((\lambda y)^2+2(\lambda x)^2\right)$$
$$=-\lambda y\left(\lambda^2y^2+2\lambda^2x^2\right)$$
$$=-\lambda y\left(\lambda^2\right)\left(y^2+2x^2\right)$$
$$=\lambda^3\left(-y\left(y^2+2x^2\right)\right) \qquad m=3$$

$$N(\lambda x,\lambda y)=2(\lambda x)\left((\lambda x)^2+(\lambda y)^2\right)$$
$$=2\lambda x\left(\lambda^2x^2+\lambda^2y^2\right)$$
$$=2\lambda x\left(\lambda^2\right)\left(x^2+y^2\right)$$
$$=\lambda^3\left(2x\left(x^2+y^2\right)\right) \qquad n=3$$

$$\therefore\ m=n$$

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

$$u=\frac{y}{x} \longrightarrow y=x\cdot u \qquad y(x)=x\cdot u(x)$$

$$-(x\cdot u)\left(x^2u^2+2x^2\right)+ \qquad \frac{dy}{dx}=x\cdot\frac{du}{dx}+u$$

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

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

$$-x^3u^3-2x^3\cancel{u}+2x^3\cancel{u}+2u^3x^3+\left(2x^4+2u^2x^4\right)\frac{du}{dx}=0$$

$$\left(-x^3u^3+(0)+2u^3x^3\right)+\left(2x^4+2u^2x^4\right)\frac{du}{dx}=0$$

$$u^3x^3+x^4\left(2+2u^2\right)\frac{du}{dx}=0$$

$$P(x)=x^3$$
$$Q(u)=u^3 \qquad \text{Variables separables}$$
$$R(x)=x^4$$
$$S(u)=2+2u^2$$

$$\int\frac{x^3}{x^4}dx+\int\frac{2\left(1+u^2\right)}{u^3}du=C_1$$

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

$$Lx+2\int\frac{du}{u^3}+2\int\frac{du}{u}=C_1$$

$$Lx+\frac{2}{-2}u^{-2}+2L(u)=C_1$$

$$-\frac{1}{u^2}+Lx+L\left(u^2\right)=C_1$$

$$-\frac{1}{u^2}+Lx+L\left(u^2\right)=C_1$$

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

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

$$F(x, y) = c_1$$

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

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

$$\frac{dy}{dx} = -\frac{\frac{\partial F}{\partial x}}{\frac{\partial F}{\partial y}}$$

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

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

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

$$\boxed{\begin{aligned}y(x)&=x\cdot u(x)\\ \frac{dy}{dx}&=x\frac{du}{dx}+u\end{aligned}}$$

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

$$=\lambda\left[-\sqrt{x^2-y^2}-y\right] \qquad m=1$$

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

$$=\lambda(x) \qquad n=1$$

$m=n$

CH.

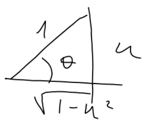
$$x\left(x\frac{du}{dx}+u\right)=\sqrt{x^2-(xu)^2}+xu$$

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

$$x^2\frac{du}{dx}+\cancel{x}u=\sqrt{x^2}\left(\sqrt{1-u^2}\right)+\cancel{x}u)$$

$$x^2\frac{du}{dx}+\cancel{xu}=x\sqrt{1-u^2}+\cancel{xu}$$

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



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

$$\operatorname{sen}\theta=\frac{u}{1}$$

$$u=\operatorname{sen}\theta$$

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

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

$$\int\frac{\cancel{\cos}(\theta)\,d\theta}{\cancel{\cos}(\theta)}=\int d\theta\Rightarrow\theta$$

$$\theta=\operatorname{ang\,sen}(u)$$

$$\operatorname{ang\,sen}(u)=\ln x+C_1$$

SG $$\boxed{\operatorname{ang\,sen}\left(\frac{y}{x}\right)=\ln x+C_1}$$