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

COEFICIENTES HOMOGENEOS

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

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

$$y(x) = \mu(x)\cdot x \qquad \frac{dy}{dx} = \mu(x)\cdot 1 + x\frac{d\mu}{dx}$$

$\Big\downarrow$ VS.

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

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

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

M N

$M(\lambda x,\lambda y)$

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

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

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

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

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

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

$\hookrightarrow -(\lambda x)=\lambda(-x)$

$n=1$

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

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

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

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

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

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

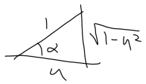
$x\sqrt{1-u^2}-x^2\frac{du}{dx}=0$

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

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

$\int\frac{du}{\sqrt{1-u^2}}=\int\frac{-\text{sen}\,\alpha\,d\alpha}{\text{sen}\,\alpha}\Rightarrow-\int d\alpha=-\alpha$

$\cos\alpha=\frac{u}{1}$ $\quad du=-\text{sen}\,\alpha\,d\alpha$



$\text{sen}\,\alpha=\frac{\sqrt{1-u^2}}{1}$

$\text{ang sen}(u)=Lx+C$

$\text{ang sen}\left(\frac{y}{x}\right)=Lx+C$

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

$\frac{y}{x}=\text{sen}(Lx+C)$

$y=x\,\text{sen}(Lx+C)$

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

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

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

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

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

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

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

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

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

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

$$-2x^2u + 3ux^2 - u^3x^2 + 3x^3\frac{dy}{dx} - u^2x^3\frac{du}{dx} = 0$$

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

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

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

$$V = u-u^3 \qquad \int\frac{(3-u^2)du}{u-u^3} = -\int\frac{dx}{x} + C$$

$$dV = (1-3u^2)du$$

$$\frac{1}{3}\int\frac{(1-3u^2)du}{u-u^3} + \frac{1}{3}\int\frac{8\,du}{u-u^3} = -\ln(x) + C$$

$$\frac{1}{3}\ln(u-u^3) + \frac{8}{3}\int\frac{du}{u-u^3} = -\ln(x) + C$$

$$\frac{1}{u-u^3} = \frac{A}{u} - \frac{B}{(u-1)} - \frac{C}{(u+1)}$$

$$(u+1)(u-1) = u^2-1$$

$$1 = A(1-u^2) - B(u^2+u) - C(u^2-u)$$

$$1 = u^2(-A-B-C) + u(-B+C) + (A)$$

$$A = 1$$

$$-A-B-C = 0 \qquad -B-C = 1 \qquad -2B = 1 \qquad B = -\frac{1}{2}$$

$$-B+C = 0 \qquad -B+C = 0 \qquad C = B \qquad C = -\frac{1}{2}$$

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

$$= \frac{1}{3}\ln u + \frac{1}{6}\ln(u+1) + \frac{1}{6}\ln(u-1)$$