Método de Coeficientes Homogéneos

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

Se sustituyen $x \Rightarrow \lambda x \quad y \Rightarrow \lambda y$

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

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

Variables Separables.

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

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

Variables Separables.

149.- $y' = \dfrac{2xy}{3x^2 - y^2}$

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

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

$M(x,y) = -2xy \qquad M(\lambda x, \lambda y) = -2(\lambda x)(\lambda y)$

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

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

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

$m = n$

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

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

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

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

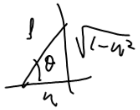
$$x^2(u - u^3) + x^3(3 - u^2)\frac{du}{dx} = 0$$

SG $\Rightarrow \displaystyle\int \frac{x^2}{x^3}dx + \int \frac{(3-u^2)\,du}{u-u^3} = C_1 \qquad r = u - u^3, \quad dr = 1 - 3u^2$

$$\int \frac{dx}{x} + \frac{1}{3}\int \frac{(9 - 3u^2)\,du}{u - u^3} = C_1$$

$$Lx + \frac{1}{3}\int \frac{(1 - 3u^2)\,du}{u - u^3} + \frac{8}{3}\int \frac{du}{u - u^3} = C_1$$

$$Lx + \frac{1}{3}L(u - u^3) + \frac{8}{3}\int \frac{du}{u(1-u^2)} = C_1$$



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

$du = -\operatorname{sen}(\theta)\,d\theta \qquad 1 - u^2 = \operatorname{sen}^2(\theta)$

$$-\frac{8}{3}\int \frac{-\operatorname{sen}(\theta)\,d\theta}{\cos(\theta)\operatorname{sen}^2(\theta)} \Rightarrow \frac{8}{3}\int \frac{d\theta}{\cos(\theta)\operatorname{sen}(\theta)}$$

149. $C\,(y^2 - x^2) = y^3.$

$$EcuacionDos := \frac{d}{dx}\,u(x) = -\frac{u(x)\,\left(-1 + u(x)^2\right)}{x\,\left(-3 + u(x)^2\right)}$$

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

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

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

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

$$u\left(u^2-1\right)dx + x\left(-3+u^2\right)du = 0$$

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

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