$$\boxed{\text{MSV}} \longrightarrow \boxed{\text{MSDOE}} \longrightarrow \boxed{\text{MFI.}} \longrightarrow \boxed{\text{MCH}}$$

+ MÉTODO DE COEFICIENTES HOMOGÉNEOS

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

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

EDO(1)NL-CH.

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

1ª opción

$$\boxed{y(x) = u(x)\cdot x}$$

$$\frac{d}{dx}y(x) = u(x)\cdot(1) + x\frac{d}{dx}u(x)$$

$$M(x, ux) + N(x, ux)\left(u + x\frac{du}{dx}\right) = 0$$

EDO(1)NL VS.

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

2ª opción

$$\boxed{x(y) = v(y)\cdot y} \qquad \frac{dx}{dy} = v(y)\cdot(1) + y\frac{dv}{dy}$$

$$M(vy, y)\left(v + y\frac{dv}{dy}\right) + N(vy, y) = 0$$

EDO(1)NL VS

$$M(x, ux) + N(x, ux)\left(u + x\frac{du}{dx}\right) = 0$$

$$P(x)\,Q(u) + R(x)\,S(u)\,\frac{du}{dx} = 0$$

$$SG \Rightarrow \int \frac{P(x)}{R(x)}\,dx + \int \frac{S(u)}{Q(u)}\,du = C_1$$

$$F(x, u) = C_1 \qquad y = u \cdot x \qquad u = \frac{y}{x}$$

$$\boxed{G(x, y) = C_1}$$

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

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

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

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

EDO(1) NL - CH. $\qquad m = n$

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

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

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

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

$$\underset{P}{x^2}\underset{Q}{(u - u^3)} + \underset{R}{x^3}\underset{S}{(3 - u^2)}\frac{du}{dx} = 0$$

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

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

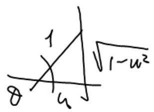
$$r = u - u^3$$
$$dr = (1 - 3u^2)\,du$$

$$+\frac{1}{3}\int \frac{9 - 3u^2}{u - u^3}du$$

$$+\frac{1}{3}\left(\int \frac{1 - 3u^2}{u - u^3}du + \int \frac{8\,du}{u - u^3}\right)$$

$$+\frac{1}{3}\int \frac{dr}{r} + \frac{8}{3}\int \frac{du}{u - u^3}$$

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



$$+\frac{8}{3}\int \frac{-\operatorname{sen}(\theta)\,d\theta}{\cos(\theta)\operatorname{sen}^2(\theta)} \qquad \frac{u}{1} = \cos(\theta)$$

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

$$-\frac{8}{3}\int \frac{d\theta}{\cos(\theta)\operatorname{sen}(\theta)} \qquad 1 - u^2 = \operatorname{sen}^2(\theta)$$

$$du = -\operatorname{sen}(\theta)\,d\theta$$

$$SG \Rightarrow \frac{+x^2y^2 - x^4}{y^3} = C_1$$

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

$$\frac{1}{y^3}\left(2xy^2 - 3x^2\right) + \left(\frac{y^3(2x^2y - (0)) - (x^2y^2 - x^4)(3y^2)}{y^6}\right) \cdot \frac{dy}{dx} = 0$$

$$\frac{2xy^2 - 3x^2}{y^3} + \frac{2y^4x^2 - 3x^2y^4 + 3x^4y^2}{y^6}\frac{dy}{dx} = 0$$

$$y^3(2xy^2 - 3x^2) + (2y^4x^2 - 3x^2y^4 + 3x^4y^2)\frac{dy}{dx} = 0$$

$$+y^2(2x^2y^2 - 3x^2y^2 + 3x^4)\frac{dy}{dx} = 0$$

$$(2xy^2 - 3x^2) + \frac{(-x^2y^2 + 3x^4)}{y}\frac{dy}{dx} = 0$$

$$\frac{dy}{dx} = \frac{(2xy^2 - 3x^2)y}{-x^2y^2 + 3x^4}$$

$$=$$

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

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

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

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

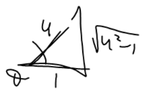
C.H.

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

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

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

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



$u = \sec(\theta)$

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

$du = \sec(\theta)\tan(\theta)\,d\theta$

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

$$\int \frac{dx}{x} - \int \frac{\sec(\theta)\tan(\theta)\,d\theta}{\tan(\theta)} = C_1$$

$$Lx - \int \sec(\theta)\,d\theta = C_1$$

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

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

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

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

$$\boxed{\frac{x^2}{y + \sqrt{y^2 - x^2}} = C_1} \quad \text{SG}$$