

Guía de Ejercicios

Ecuaciones Diferenciales Ordinarias MA26A

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1.- Resolver las siguientes EDO's.

- $(1 + e^x)yy' = e^x$
 - Sol: $y^2 = 2\ln(1 + e^x) + C$
- $(x-4)y^4dx - x^3(y^2-3)dy = 0$
 - Sol: $-\frac{1}{x} + \frac{2}{x^2} + \frac{1}{y} - \frac{1}{y^3} = C$
- $(x^2 - 3y^2)dx + (2xy)dy = 0$
 - Sol: $Kx^3 = x^2 - y^2$
- $(x + y - 2)dx + (x - y + 4)dy = 0$
 - Sol: $(x+1)^2 \left[1 + 2\frac{y-3}{x+1} - \left(\frac{y-3}{x+1}\right)^2 \right] = 0$
- $(x + y - 1)dx + (2x + 2y - 1)dy = 0$
 - Sol 1: $x = 2(x + y) - \ln |x + y| + C$
 - Sol 2: $y = -x$
- $(3x^2 + 4xy)dx + (2x^2 + 2y)dy = 0$
 - Sol: $x^3 + 2x^2y + y^2 = K$
- $y^2 + (xy + 1)y' = 0$
 - Sol: $ye^{xy} = C$
- $(x^2 + 1)y' + 4xy = 0$ con $y(2) = 1$
 - Sol: $y = \frac{25}{(x^2 + 1)^2}$
- $y' + 2xy = 4x$
 - Sol: $y = 2 + Ce^{-x^2}$
- $(x^2 + 1)y' + 4xy = x$

- **Sol:** $(x^2 + 1)^2 y - \frac{x^4}{4} - \frac{x^2}{2} = K$
- $y' + y = xy^3$
 - **Sol:** $\frac{1}{y^2} = x - \frac{1}{2} + Ce^{2x}$
- $y' = y^2 - 2xy + 1 + x^2$ **HINT: Hay una solución “obvia” que puede ser útil.**
 - **Sol:** $1 = (y - x)(C - x)$
- $\left(\frac{y}{3x} + y^4 \ln(x)\right)dx - dy = 0$
 - **Sol:** $y = \frac{1}{\sqrt[3]{\frac{-3x}{2}\left[\ln(x) - \frac{1}{2}\right] + \frac{K}{x}}}$
- $y = x(y' + 1) + (y')^2$
 - $x = Ke^{-p} - 2(p - 1)$
 - **Sol:** $y = [Ke^{-p} - 2(p - 1)][(p + 1) + p^2]$
- $y = xy' + \frac{a}{2y'}$
 - **Sol:** $y^2 = 2ax$
- $y \frac{d^2 y}{dx^2} = 1 + \left(\frac{dy}{dx}\right)^2$
 - **Sol:** $\frac{1}{K} \ln\left(y + \sqrt{y^2 - \frac{1}{K^2}}\right) = \pm x + C$
- $y \frac{d^2 y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = \left(\frac{dy}{dx}\right)^3$
 - **Sol:** $\frac{y^2}{2} + Ky = Kx + C$
- $(y)dx + (2x)dy = 0$
 - **Sol:** $y^2 x = K$