

Trabalho 2 ETV

20150465

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a)
$$\left(\frac{2xy}{x^2+1} - x^a \right) dx - (2 - \ln(x^2+1)) dy = 0$$

$a = 5+1 ; a = 6$

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

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

$$M(x,y)dx + N(x,y)dy = 0$$

$$\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$$

$$\frac{\partial M}{\partial y} = \frac{2x}{x^2+1} \quad \frac{\partial N}{\partial x} = \frac{1}{x^2+1} \cdot 2x \quad ; \text{ exata}$$

Assim:

$$\int M(x,y) dx \Rightarrow \int \left(\frac{2xy}{x^2+1} - x^6 \right) dx \Rightarrow 2y \int \frac{x}{x^2+1} dx - \dots$$

$$\dots \int x^6 dx \Rightarrow u = x^2+1 \mid du = 2x dx + \frac{du}{2x} = dx \Rightarrow 2y \int \frac{x}{u} \frac{du}{2x} \\ \Rightarrow y \int \frac{1}{u} du \Rightarrow y [\ln|u|] \Rightarrow y [\ln|x^2+1|] \Rightarrow - \frac{x^7}{7}$$

$$\therefore \int M(x,y) dx = y \ln|x^2+1| - \frac{x^7}{7} + g(y)$$

Por outro lado:

$$\frac{\partial}{\partial y} \left(\int M(x,y) dx \right)$$

$$\frac{\partial}{\partial y} \left(y \ln(x^2+1) - \frac{x^7}{7} + g(y) \right) = \ln(x^2+1) + g'(y)$$

Assum

$$\ln(x^2+1) + g'(y) = \ln(x^2+1) - 2$$

$$g'(y) = -2$$

$$\int g'(y) dy \Rightarrow \int -2 dy \Rightarrow -2y$$

$$g(y) = -2y$$

for fun

$$u(x,y) = \int m(x,y) dx = C$$

$$u(x,y) = y \ln(x^2+1) - \frac{x^7}{7} + g(y)$$

$$u(x,y) = y \ln(x^2+1) - \frac{x^7}{7} - 2y$$

$$y \ln(x^2+1) - \frac{x^7}{7} - 2y = C$$

$$y \ln(x^2+1) - 2y = C - \frac{x^7}{7}$$

$$y (\ln(x^2+1) - 2) = C - \frac{x^7}{7}$$

$$\therefore y = \frac{C - \frac{x^7}{7}}{(\ln(x^2+1) - 2)}$$

$$b) \quad y = \frac{x^7}{7(\ln(x^2+1)-2)} + \frac{C}{(\ln(x^2+1)-2)}$$

$$x=0$$

$$y = \frac{0^7}{7(\ln(1)-2)} + \frac{C}{(\ln(1)-2)}$$

$$y = 0 + -C/2$$

$$y = \text{constante}$$

$$\frac{dy}{dx} = \frac{(2xy - x^6)}{x^2+1}$$

$$x=0 \rightarrow y' = \frac{0 - 0^6}{1} \rightarrow y' = \frac{0}{+2}$$

$$-(\ln(x^2+1)-2) \quad -(\ln(1)-2)$$

$$y' = \text{constante}$$

$$c) \quad y(x_0) = y_0 \rightarrow y(6) = 7$$

$$x_0 = 5+1 = x_0 = 6$$

$$y_0 = 6+1; y_0 = 7$$

$$y = \frac{x^7}{7(\ln(x^2+1)-2)} + \frac{C}{(\ln(x^2+1)-2)}$$

$$\frac{y \ln(x^2+1) - x^7 - 2y}{7} = C$$

$$\frac{7(\ln(6^2+1)) - (6)^7 - 2(7)}{7} = C$$

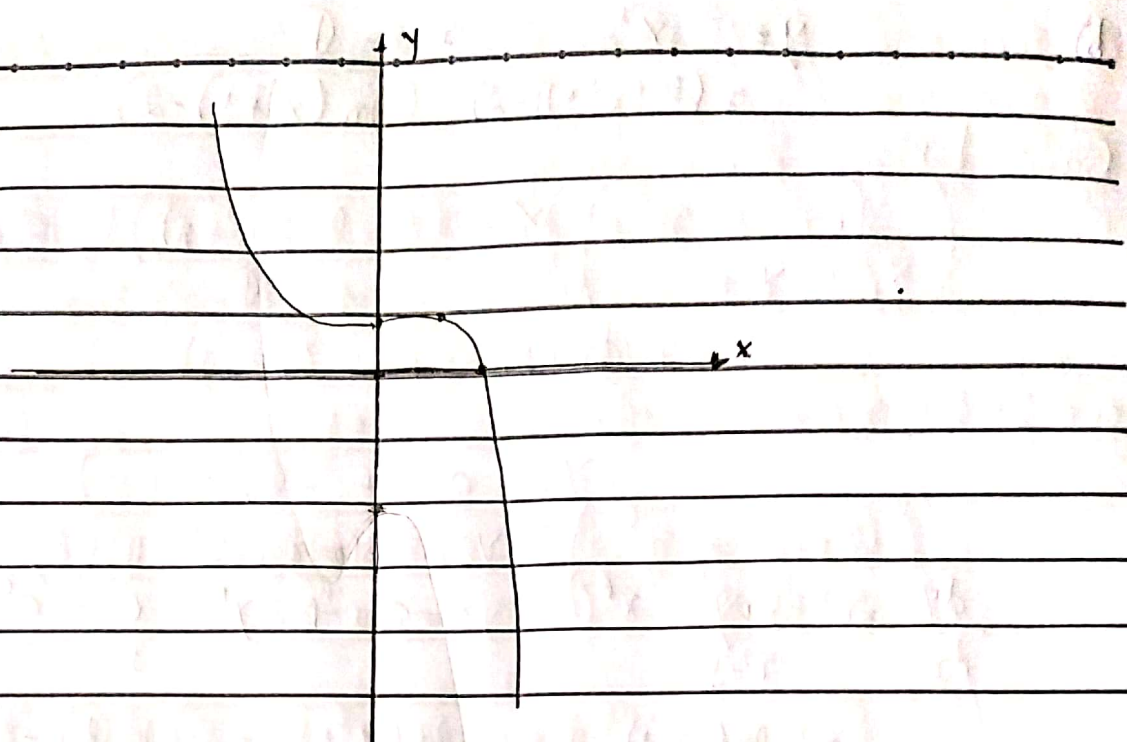
$$C = \frac{7(\ln(37)) - 279.936 - 14}{7}$$

$$C \approx -39.979,58072$$

$$\therefore y = \frac{x^7}{7(\ln(x^2+1)-2)} + \frac{(-39.979)}{\ln(x^2+1)-2}$$

$$\ln(x^2+1)-2 =$$

d) Gráfico



$$M = (1) \cdot 1 = 1 \quad \text{e} \quad y = (1) \cdot 1 = 1$$

$$M = 1 \quad \text{e} \quad 1 = 1$$