

$$\frac{d^2 y}{dx^2} \cdot x^2 + \frac{dy}{dx} \cdot x + y = 0$$

$$1. \quad y = \text{sen}(\ln(x)) + \cos(\ln(x))$$

$$y' = \cos(\ln(x)) \cdot \frac{1}{x} + (-\text{sen}(\ln(x))) \cdot \frac{1}{x}$$

$$y' = \frac{\cos(\ln(x)) - \text{sen}(\ln(x))}{x}$$

$$y'' = \frac{(\cos(\ln(x)) - \text{sen}(\ln(x)))' \cdot x - (\cos(\ln(x)) - \text{sen}(\ln(x))) \cdot 1}{x^2}$$

$$y'' = \frac{(-\text{sen}(\ln(x)) \cdot \frac{1}{x} - \cos(\ln(x)) \cdot \frac{1}{x}) \cdot x - (\cos(\ln(x)) + \text{sen}(\ln(x)))}{x^2}$$

$$y'' = -\frac{2\cos(\ln(x))}{x^2}$$

$$\frac{-2\cos(\ln(x))}{x^2} \cdot x^2 + \frac{\cos(\ln(x)) - \text{sen}(\ln(x))}{x} \cdot x + \text{sen}(\ln(x)) + \cos(\ln(x)) = 0$$

$$-2\cos(\ln(x)) + \cos(\ln(x)) - \cancel{\text{sen}(\ln(x))} + \cancel{\text{sen}(\ln(x))} + \cos(\ln(x)) = 0$$

$$-\cancel{2\cos(\ln(x))} + \cancel{2\cos(\ln(x))} = 0$$

$$0 = 0$$

2.. a) $y = 3^{\tan(x^3+x)} / \ln$

$$\ln(y) = \ln(\tan(x^3+x)) \cdot \ln(3)$$

$$\frac{y'}{y} = \sec^2(x^3+x) \cdot (3x^2+1) \cdot \ln(3)$$

$$y' = \left(\sec^2(x^3+x) \cdot (3x^2+1) \cdot \ln(3) \right) \cdot 3^{\tan(x^3+x)}$$

b) $\frac{(e^x-x)^{10} \cdot (8+x^3)^2}{\sqrt{6+\sqrt{x}}} / \ln$

$$\ln(y) = \frac{10 \ln(e^x-x) \cdot 2 \ln(8+x^3)}{\frac{1}{2} \ln(6+\sqrt{x})}$$

$$\rightarrow \frac{1}{2} \ln(6) + \frac{1}{2} \ln(x^4)$$

$$\ln(y) = 10 \ln(e^x-x) + 2 \ln(8+x^3) - \left(\frac{1}{2} \ln(6+\sqrt{x}) \right) \quad \frac{dy}{dx}$$

$$\frac{y'}{y} = 10 \cdot \frac{1}{e^x-x} \cdot (e^x-1) + 2 \frac{1}{8+x^3} (3x^2) - \left(\frac{1}{2} \cdot \frac{1}{6+\sqrt{x}} \cdot \frac{1}{2\sqrt{x}} \right)$$

$$y' = \left(\frac{10}{e^x-x} \cdot (e^x-1) + \frac{6x^2}{8+x^3} - \frac{1}{2 \cdot (6+\sqrt{x})(\sqrt{x})} \right) \cdot \frac{(e^x-x)^{10} \cdot (8+x^3)^2}{\sqrt{6+\sqrt{x}}}$$

c) $\frac{\sin(x) \cdot (x^2+x)^{3x}}{110} / \ln \Rightarrow \frac{\ln(y) = \ln(\sin(x)) + 3x \cdot \ln(x^2+x) - \ln(110)}{\ln(110)}$

$$\ln(y) = \ln(\sin(x)) + 3x \cdot \ln(x^2+x) - \ln(110) \quad \frac{dy}{dx}$$

$$\frac{y'}{y} = \left[\frac{1}{\sin(x)} \cdot \cos(x) + 3 \ln(x^2+x) + 3x \cdot \frac{1}{x^2+x} (2x+1) \right] - 0$$

$$y' = \left(\frac{\cos(x)}{\sin(x)} + 3 \ln(x^2+x) + \frac{3x(2x+1)}{x^2+x} \right) \cdot \left(\frac{\sin(x) \cdot (x^2+x)^{3x}}{110} \right)$$

$$b) y + x \cdot \sqrt{1+2y} = x^2$$

Pergunta 3B

$$y' + (\sqrt{1+2y}) + x \cdot \frac{1}{2\sqrt{1+2y}} \cdot 2y' = 2x$$

$$y' + 1\sqrt{1+0} + 1 \cdot \frac{1}{2\sqrt{1}}$$

$$y' + \left(\sqrt{1+2y} + \frac{x y'}{\sqrt{1+2y}} \right) = 2x$$

$$y' + \left(\frac{1+2y + x y'}{\sqrt{1+2y}} \right) = 2x$$

$$y'(\sqrt{1+2y}) + (1+2y + x y') = 2x(\sqrt{1+2y})$$

$$y'(\sqrt{1+2y} + x) = 2x\sqrt{1+2y} - 2y - 1$$

$$y' = \frac{2x\sqrt{1+2y} - 2y - 1}{\sqrt{1+2y} + x} = y' = \frac{2 \cdot 1(\sqrt{1+0} - 0 - 1)}{\sqrt{1+0} + 1}$$

$$y' = \frac{1}{2}$$

3.. Sea $y^2 = x^3 + \sin(xy) - x \ln(y)$ 3a

$$\frac{dy}{dx} = 2y \cdot y' = 3x^2 + (\cos(xy) \cdot (y + x \cdot y')) - (\ln(y) + x \cdot \frac{1}{y} \cdot y')$$

$$2y \cdot y' + \frac{x}{y} \cdot y' - \cos(xy) \cdot (x \cdot y') = 3x^2 - \ln(y) + \cos(xy) \cdot y$$

$$y' \left(2y + \frac{x}{y} - \cos(xy) \cdot (x) \right) = (3x^2 - \ln(y) + \cos(xy) \cdot y)$$

$$y' = \frac{(3x^2 - \ln(y) + \cos(xy) \cdot y)}{2y + \frac{x}{y} - \cos(xy) \cdot x}$$

4.. Lt

$$\text{CURVA} = 3x^2y + y^2 - 3x = 0 \quad p(1, -4)$$

$$\frac{dy}{dx} = 3x^2 \cdot y + y + y^2 = 0$$

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

$$-24 + 3 \cdot y' + -8y' - 3 = 0$$

$$-27 = 5y'$$

$$\frac{-27}{5} = y'$$

$$m = -\frac{27}{5}$$

$$(y - y_1) = m(x - x_1)$$

$$y + 4 = -\frac{27}{5}(x - 1)$$

$$y = -\frac{27}{5}x + \frac{7}{5}$$

$$b) f(x) = x^3 - 8x + 2$$

$$y = x^3 - 8x + 2 \quad \left(\frac{dy}{dx} \right)$$

$$y' = 3x^2 - 8$$

~~12~~

$$3x^2 - 8 = 4$$

$$3x^2 = 12$$

$$x^2 = 4 \quad | \sqrt{}$$

$$x = 2$$

$$m = 4$$

$$y = 8 - 16 + 2$$

$$y = -6$$

$$p = (2, -6)$$

$$l_v = (y - y_1) = m(x - x_1)$$

$$y + 6 = -\frac{1}{4}(x - 2)$$

$$y = -\frac{1}{4}x + \frac{1}{2} - 6$$

$$y = -\frac{1}{4}x - \frac{11}{2}$$