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Pregunta n.º 1.

$$y = \sin(\ln(x)) + \cos(\ln(x))$$

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

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

$$y'' = \left(-\sin(\ln(x)) \cdot \frac{1}{x} - \cos(\ln(x)) \cdot \frac{1}{x} \right) \cdot x$$

$$= \frac{\cos(\ln(x)) - \sin(\ln(x)) \cdot 1}{x^2}$$

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

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

$$y'' \cdot x^2 + y' \cdot x + y = 0$$

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

$$0 = 0 //$$

Exercício n° 2.

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

$$\begin{aligned} \ln y &= \ln 3^{\tan(x^3+x)} \\ &= \tan(x^3+x) \cdot \ln 3 \\ &= \sec^2(x^3+x) \cdot (3x^2+1) \cdot \ln 3 + \tan(x^3+x) \cdot 0 \end{aligned}$$

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

$$\begin{aligned} y' &= y \cdot (\sec^2(x^3+x) \cdot (3x^2+1) \cdot \ln(3)) \\ &= 3^{\tan(x^3+x)} \cdot (\sec^2(x^3+x) \cdot (3x^2+1) \cdot \ln(3)) \end{aligned}$$

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

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

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

$$= 10 \cdot \frac{1}{e^x - x} \cdot (e^x - 1) + 2 \cdot \frac{1}{(8 + x^3)} \cdot (3x^2) - \frac{1}{2} \cdot \frac{1}{6 + \sqrt{x}} \cdot \left(0 + \frac{1}{2\sqrt{x}}\right)$$

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

$$y' = \frac{(e^x - x)^{10} \cdot (8 + x^3)^2}{\sqrt{6 + \sqrt{x}}} \left(\frac{10(e^x - 1)}{e^x - x} + \frac{6x^2}{(8 + x^3)} - \frac{1}{4\sqrt{x}(6 + \sqrt{x})} \right)$$

PROPRIETÀ

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

$$\ln y = \ln \sin(x) + \ln (x^2 + x)^{3x} - \ln 110$$

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

$$= \frac{\cos(x)}{\sin(x)} + 3x \cdot \frac{1}{(x^2 + x)} \cdot (2x + 1)$$

$$\frac{1}{y} \cdot y' = \cotang(x) + \frac{3x(2x+1)}{x^2 + x} \quad / \cdot y$$

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

Pregunta n° 3

$$\frac{(1 \cdot y) + (x \cdot y')}{y + xy'}$$

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

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

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

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

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

$$b) \quad y + x\sqrt{1+2y} = x^2 \quad (1, 0)$$

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

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

$$y' + \frac{2xy'}{2\sqrt{1+2y}} = 2x - \sqrt{1+2y}$$

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

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

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

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

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

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

$$y' = 1/2$$

Pregunta m'4

a) Ec. recta tangente

$$3x^2y + y^2 - 3x = 1 \quad \text{en el punto } (1, -4)$$

1. $(1, -4)$

2. $3x^2y + y^2 - 3x = 1$

$$6xy + 3x^2 \cdot y' + 2y \cdot y' - 3 = 0$$

$$3x^2 y' + 2y y' = 3 - 6xy$$

$$y' (3x^2 + 2y) = 3 - 6xy$$

$$y' = \frac{3 - 6xy}{3x^2 + 2y}$$

$$y' = \frac{3 - 6(1 \cdot -4)}{(3 \cdot 1) + (2 \cdot -4)}$$

$$= 27 / -5$$

3. $y - y_1 = m(x - x_1)$
 $y + 4 = \frac{27}{-5}(x - 1) \quad / \cdot -5$

$$-5y - 20 = 27x - 27$$

$$-5y = 27x - 27 + 20$$

$$-5y = 27x - 7$$

$$5y = -27x + 7$$

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

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

$$m_c = 4$$

$$m_c \cdot m_N = -1$$

$$m_N = -1/4$$

$$y' = 3x^2 - 8 + 0$$

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

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

$$12 = 3x^2$$

$$4 = x^2$$

$$\pm 2 = x$$

$$-6 = y$$

$$f(2) = 2^3 - 8 \cdot (2) + 2$$

$$= 8 - 16 + 2$$

$$= -8 + 2$$

$$= -6$$

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

$$= -8 + 16 + 2$$

$$\textcircled{1} \quad y - y_1 = m(x - x_1) \quad P(-2, 10)$$

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

$$L_m = 4y + 24 = -x + 2$$

$$4y = -x + 2 - 24$$

$$4y = -x - 22$$

$$y = \frac{-x - 22}{4}$$

$$\textcircled{2} \quad y - 10 = -\frac{1}{4}(x + 2)$$

$$y = -\frac{1}{4}x - \frac{1}{2} + 10$$

$$L_{N_2} : y = -\frac{1}{4}x + 19/2$$