

Pregunta 1

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

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

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

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

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

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

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

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

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

$$0 = 0$$

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

Pregunta 2

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

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

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

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

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

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

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

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

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

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

Estimado!

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

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

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

$$\ln(y) = \ln(\ln(x)) + 3x \cdot \ln(x^2+x) - \ln(110)$$

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

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

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

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

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

$$\begin{aligned} 1 - 5 &= 1 + 1 \\ 1 &= 1 \\ 1 &= 1 \end{aligned}$$

Pregunta 3

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

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

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

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

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

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

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

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

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

$$y' + y' = 2 - 1$$

$$2y' = 1$$

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

Pregunta 4

a) [T P(1, -4) $3x^2y + y^2 = 3x + 1$

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

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

$$6 \cdot 1 \cdot (-4) + 3 \cdot 1^2 \cdot y' + 2 \cdot (-4) \cdot y' - 3 = 0$$

$$-24 + 3y' - 8y' = 3$$

$$-27 = 5y'$$

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

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

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

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

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

b) L_N

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

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

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

$$3x^2 = 12$$

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

$$x = 2$$

$$y = 8 - 16 + 2$$

$$y = -6$$

$$P(2, -6)$$

$$L_{N_1} = y = -\frac{1}{4}x - \frac{11}{2}$$

$$L_{N_2} = y + 6 = -\frac{1}{4}(x - 2)$$

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

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