Pregunta 1

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

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

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

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

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

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

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

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

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

$$0 = 0$$

Pregunta 2

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$\frac{1}{y} \cdot y' = (\cot g\,x + 3\ln(x^2+x) + \frac{3\cancel{x}(2x-1)}{\cancel{x}(x+1)}$

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

$y' = [\cot g\,x) + 3\ln(x^2+x) + \frac{3(2x-1)}{(x+1)} \cdot \left(\frac{sen(x) \cdot (x^2+3)^{3x}}{110}\right)$

Pregunta 3

a) $y^2 = x^3 + \text{sen}(xy) - x\ln(y)$

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

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

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

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

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

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

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

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

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

$y' + y' = 2 - 1$

$2y' = 1$

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

Pregunta 4

a) LT $\quad P(1,-4) \quad 3x^2y+y^2-3x=1$

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

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

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

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

$-27=5y'$

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

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

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

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

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

b) L_N

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

$y' = 3x^2 - 8$

$3x^2 - 8 = 4$

$3x^2 = 12$

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

$x = 2$

$y = 8 - 16 + 2$

$y = -6 \qquad P(2, -6)$

$LN_1 = y = -\frac{1}{4}x - \frac{11}{2}$

$LN_2 = y + 6 = -\frac{1}{4}(x - 2)$

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

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

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