Gonzalo Fernando Pizarro Figueroa 2° Eco.

Pregunta n°1.

$y = \operatorname{sen}(\ln(x)) + \cos(\ln(x))$

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

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

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

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

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

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

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

$0 = 0$ //

Pregunta n° 2.

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

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

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

$= \sec^2(x^3+x) \cdot (3x^2+1) \cdot \ln 3 + \tan(x^3+x) \cdot 0$

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

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

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

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

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

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

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

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

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

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

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

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

$= \dfrac{\cos(x)}{\operatorname{sen}(x)} + 3x \cdot \dfrac{1}{(x^2 + x)} \cdot (2x + 1)$

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

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

Pregunta n°3

$$(1\cdot y) + (x\cdot y') \rightarrow y + xy'$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$y' = 1/2$$

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Pregunta n°4

a) Ec recta tangente

$3x^2y + y^2 - 3x = 1$ en el punto $(1, -4)$

1.- $(1, -4)$

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

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

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

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

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

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

$= 27 / -5$

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

$y + 4 = \dfrac{27}{-5}(x - 1) \quad / \cdot -5$

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

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

$-5y = 27x - 7$

$5y = -27x + 7$

$L_t: \quad y = \dfrac{-27x + 7}{5}$

8 - 16 + 2 =

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

$m_t = 4$

$m_t \cdot m_N = -1$

$m_N = -1/4$

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

$y' = 3x^2 - 8$

$4 = 3x^2 - 8$

$12 = 3x^2$

$4 = x^2$

$\pm 2 = x$

$-6 = y$

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

$= 8 - 16 + 2$

$= -8 + 2$

$= -6$

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

$= -8 + 16 + 2$

① $y - y_1 = m(x - x_1)$ $P(-2, 10)$

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

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

$4y = -x + 2 - 24$

$4y = -x - 22$

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

② $y - 10 = -\frac{1}{4}(x + 2)$

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

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