# Prueba N°5 Matemáticas:

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Pregunta 1: $y = \operatorname{sen}(\ln x) + \cos(\ln x)$

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

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

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

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

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

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

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

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

$$0 = 0.$$

Pregunta 2: $\frac{dy}{dx}$

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

$\ln(y) = \tan(x^3+x) \cdot \ln(3)$ $\quad \xrightarrow{\frac{d}{dy}}$

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

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

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

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

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

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

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

Pregunta 2:

c)

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

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

$$\ln(y) = (\ln(\operatorname{sen}(x)) + 3x\cdot\ln(x^2+x)) - \ln(110) \quad \xrightarrow{\frac{d}{dx}}$$

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

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

Pregunta 3:

a) $y^2 = x^3 + \operatorname{sen}(xy) - x\ln(y) \rightarrow \frac{dy}{dx}$

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

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

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

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

b) $y + x \cdot \sqrt{1+2y} = x^2 \xrightarrow{\frac{d}{dx}} y'(1,0)$

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

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

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

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

$y' + 1 + 1 \cdot y' = 2$

$y' + y' = 2 - 1$

$2y' = 1$

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

Pregunta 4:

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

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

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

$6 \cdot -4 + 3 \cdot 1 \cdot y' + (-8) \cdot y' - 3 = 0.$

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

$-27 + 3y' - 8y' = 0.$

$-27 - 5y' = 0.$

$\frac{-27}{5} = 5y'$ →

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

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

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

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

$y = -\frac{27x}{5} + \frac{27}{5} - \frac{20}{5}$

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

Pregunta 4:

b) $f(x) = x^3 - 8x + 2$ $m_t = 4$ normal.

$y' = 3x^2 - 8$

$4 = 3x^2 - 8$

$4 + 8 = 3x^2$

$\frac{12}{3} = 3x^2$

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

$x = \pm 2$.

$y = (2)^2 - 8 \cdot 2 + 2$

$y = 8 - 16 + 2$

$y = -6$

1) $P(2, -6)$

$y = (-2)^2 - 8 \cdot (-2) + 2$

$y = -8 + 16 + 2$

$y = 10$

2) $P(-2, 10)$

1) $y - (-6) = -1/4 (x - 2)$

$y + 6 = -1/4 x + 1/2$

$y = -1/4 x - 11/2$

2) $y - 10 = -1/4 (x + 2)$

$y = -1/4 x - 1/2 + 10$

$y = -1/4 x + 19/2$