$\boxed{\text{PREGUNTA 1}}$

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

$y' = \cos(\ln x) \cdot 1/x - \operatorname{sen}(\ln x) \cdot 1/x \to y' = \boxed{\dfrac{\cos(\ln x) - \operatorname{sen}(\ln x)}{x}}$

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

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

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

$\boxed{y'' = \dfrac{-2\cos(\ln x)}{x^2}}$ $\qquad \dfrac{d^2y}{dx^2} \cdot x^2 + \dfrac{dy}{dx} \cdot x + y = 0$

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

PREGUNTA 2

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

$\ln y = Tg(x^3+x) \cdot \ln(3) \rightarrow$ ~~$tg \; \frac{1}{y} = Sec$~~

$y' \cdot \frac{1}{y} = (Sec(x^3+x)^2 \cdot \ln(3)) + (Tg(x^3+x) \cdot \frac{1}{3} \cdot 3)$ ↗ derivamos la multiplicación

$\frac{y'}{y} = (Sec^2(x^3+x) \cdot (3x^2+1) \cdot \ln 3) + (\cancel{tg(x^3+x)} \cdot \cancel{\frac{1}{3} \cdot 3})$ ↗ derivada de $3 = 0$

$0 \quad 0$

$$\boxed{dy/dx = 3^{tg(x^3+x)} (Sec^2(x^3+x) \cdot (3x^2+1) \cdot \ln 3)}$$

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

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

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

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

$\hookrightarrow$ ~~$\frac{1}{\sqrt{6+\sqrt{x}}} \cdot \frac{1}{2\sqrt{6+\sqrt{x}}} \cdot 0$~~ $+ \frac{1}{2\sqrt{x}} \cdot 1$

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

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

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

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

PREGUNTA 3

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

$$\frac{dy}{dx} + \frac{d}{dx}\left(x\sqrt{1+2y}\right) = \frac{d}{dx}x^2$$

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

$$\frac{dy}{dx} + \frac{x\frac{dy}{dx}}{\sqrt{1+2y}} = 2x - \sqrt{1+2y}$$

$$\frac{dy}{dx}\left(1 + \frac{x}{\sqrt{1+2y}}\right) = 2x - \sqrt{1+2y} \quad / \cdot \sqrt{1+2y}$$

$$\frac{dy}{dx}\left(\sqrt{1+2y} + x\right) = 2x \cdot \sqrt{1+2y} - 1 - 2y$$

$$\frac{dy}{dx} = \frac{2x\sqrt{1+2y} - 2y - 1}{x + \sqrt{1+2y}} \rightarrow \text{EN Pto } (1,0)$$

$$\frac{2\sqrt{1+0} - 0 - 1}{1 + \sqrt{1+0}} = \frac{2\sqrt{1} - 1}{1+1} = \boxed{\frac{1}{2}}$$