Comenzamos a las

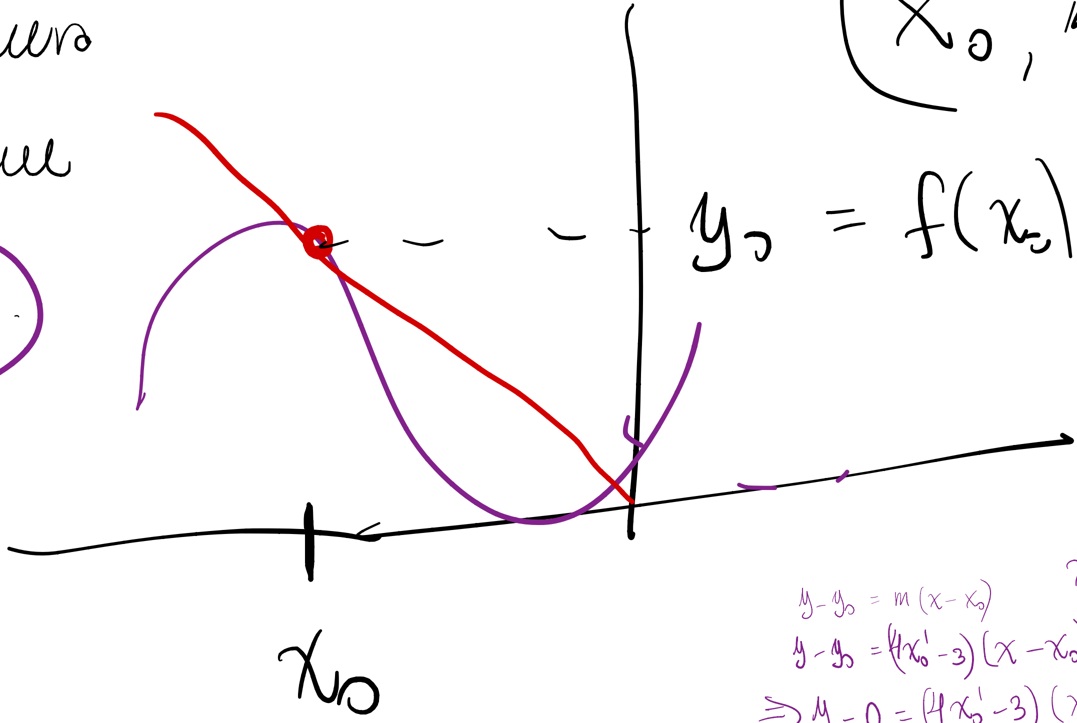
17:10

Para que se relajen un poco de la clase anterior.

Determinar la ec. recta con pendiente negativa que es tangente a la curva

$y = 2x^2 - 3x + B$ y que pasa por el punto $(0,0)$.

(x_0', y_0') ?



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

$\frac{d}{dx} y = 4x - 3$

$\Rightarrow m = 4x_0 - 3 < 0$

$y - y_0 = m(x - x_0)$

$y - y_0 = (4x_0' - 3)(x - x_0)$

$x_0 = 0$

$y_0 = 0$

$\Rightarrow y - 0 = (4x_0' - 3)(x - 0)$

$y = (4x_0' - 3)x$

$y - f(x_0) - (4x_0 - 3)(x - x_0)$

$= 4x_0 x - 4x_0^2 - 3x + 3x_0$

$y = 4x_0 x - 4x_0^2 - 3x + 3x_0 + f(x_0)$

$$y = 4x_0x - 3x - 4x_0^2 + 3x_0 + f(x_0)$$

$$= x(4x_0 - 3) - 4x_0^2 + 3x_0 + f(x_0)$$

$x = 0$ e $y = 0$

$$0 = 0(4x_0 - 3) - 4x_0^2 + 3x_0 + f(x_0)$$

$$0 = -4x_0^2 + 3x_0 + f(x_0)$$

$$= -4x_0^2 + \cancel{3x_0} + 2x_0^2 \cancel{-3x_0} + 8$$

$$0 = -2x_0^2 + 8$$

$$\Rightarrow \quad 0 = -x_0^2 + 4 \quad \Rightarrow \quad x_0^2 = 4$$

$x_0 = 2$ ó $x_0 = -2$

$y_0 = 4x_0 - 3$

$x_0 = 2$

$y_0 = 4 \cdot 2 - 3 \Rightarrow 8 - 3 = 5$

$\boxed{x_0 = -2}$

$y_0 = 4(-2) - 3 \Rightarrow -8 - 3 = -11$

$$y = \underbrace{(4x_0 - 3)} x$$

$$y = -11x$$

Sea $f(x)$ una función derivable e invertible, tal que la recta tangente en el punto $\boxed{(1, f(1)) = (1,2)}$ tiene pendiente 3. Calcule $(f^{-1})'(2)$.

$$1 \underset{f^{-1}}{\overset{f}{\rightleftarrows}} 2$$

$$f'(1) = 3$$

$$(f')^{-1}(3) = 1 \quad f^{-1}$$

$$(f^{-1})(2) = 1$$

Sol: $f(1) = 2$

recta

$$y - \underbrace{y_0}_{2} = \underbrace{m}_{3}(x - \underbrace{x_0}_{1})$$

$$\boxed{y - 2 = 3(x - 1)}$$

no

Camino correcto

$$f^{-1}(f(x)) = x$$

$$f^{-1\,'}(f(x)) \cdot f'(x) = 1$$

$$f^{-1\,'}(f(x)) = \frac{1}{f'(x)}$$

$x = 1$

$$\Rightarrow f^{-1\,'}(f(1)) = \frac{1}{f'(1)}$$

$$f^{-1\,'}(2) = \frac{1}{f'(1)}$$

$$(f^{-1})'(2) = \frac{1}{3}$$

Determine una función f y número real a de modo que

$$\boxed{\lim_{x\to 1} \frac{x^{1000}-1}{x-1}} = f'(a)$$

Utilice esta información para calcular el límite

$$\lim_{x\to a} \frac{f(x)-f(a)}{x-a} = f'(a)$$

$$\boxed{f(x) = x^{1000}}$$

$$a = 1$$

$$f(a) = 1$$

$$f'(1)$$

$$f'(1)$$

$$f'(x) = 1000\,x^{999} \Rightarrow 1000\cdot 1^{999} = \underline{1000}$$

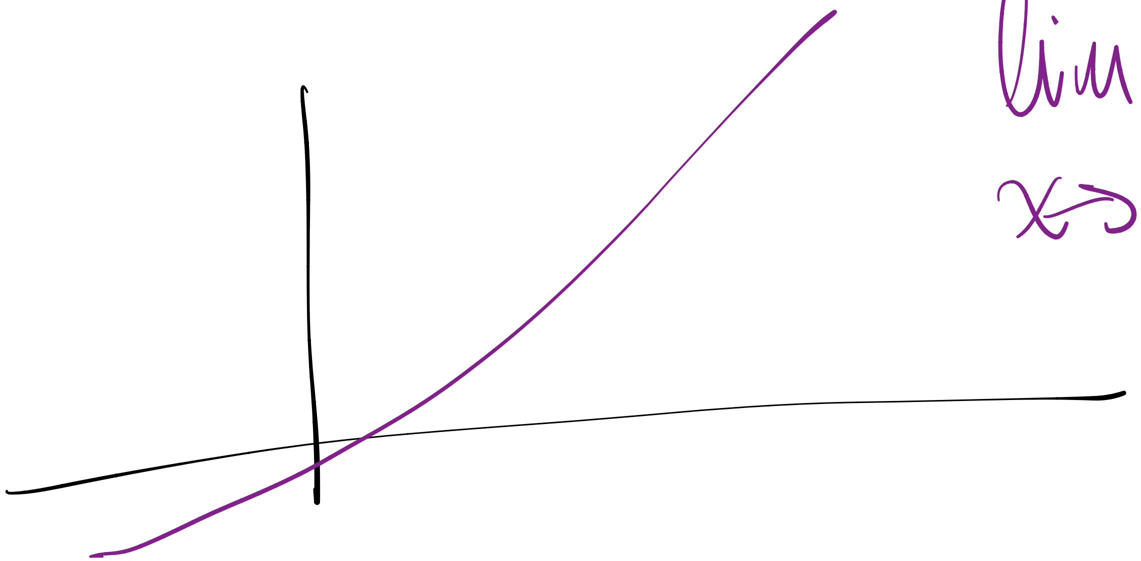
Demuestre que la ecuación $x^3 + e^x = 0$ tiene una única raíz real.

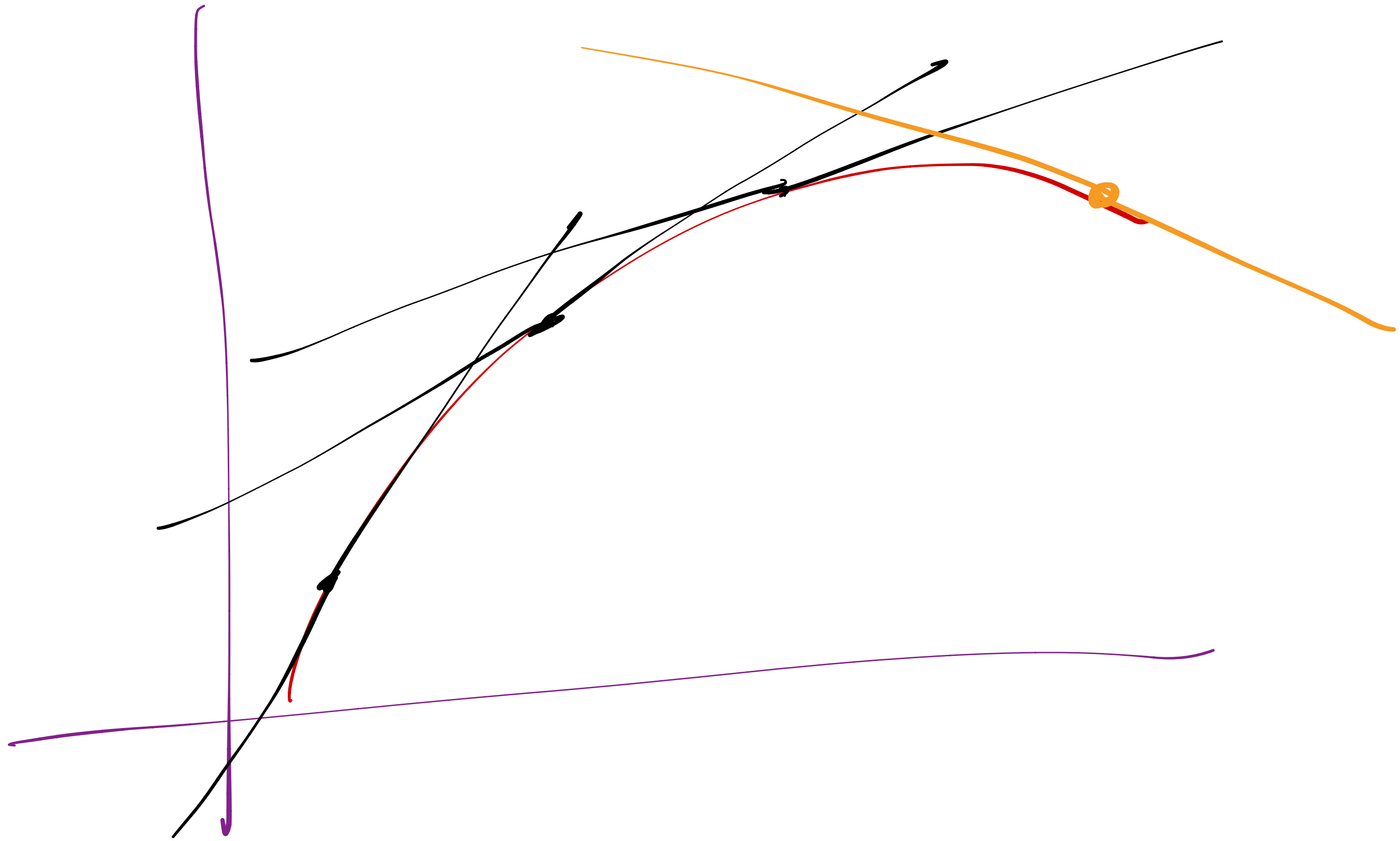
$$f(x) = x^3 + e^x$$

$$\lim_{x \to -\infty} x^3 + e^x = -\infty$$

$$f'(x) = 3x^2 + e^x > 0 \quad \forall x \in \mathbb{R}$$

$$\lim_{x \to \infty} x^3 + e^x = +\infty$$





$\circ)$ Si $\boxed{f(x) = \sqrt{x} \cdot g(x)}$ $\quad g(4) = 2 \quad$ y $\quad g'(4) = 3$

$f'(4) = \,?$

$$(f_1 \cdot g_1)' = (f_1' \cdot g_1 + f_1 \cdot g_1')$$

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

$$f'(4) = \frac{1}{2\sqrt{4}} \cdot g(4) + \sqrt{4} \cdot g'(4)$$

$$\frac{1}{2 \cdot \cancel{2}} \cdot \cancel{2} + 2 \cdot 3 = \frac{1}{6} + 6 =$$

Encuentre la derivada de la función

$$g(t) = \left(\frac{t-2}{2t+1}\right)^9$$

$$\left(\frac{f}{g}\right)' = \frac{f' \cdot g - f \cdot g'}{g^2}$$

$h_1(t) = t^9$

$h_2(t) = \left(\frac{t-2}{2t+1}\right) \Rightarrow h_1(h_2(t)) = g(t)$

$h_1'(t) = 9t^8$

$$h_2'(t) = \frac{1 \cdot (2t+1) - (t-2)(2)}{(2t+1)^2}$$

$$g'(t) = h_1'(h_2(t)) \cdot h_2'(t)$$

$$g'(t) = 9\left(\frac{t-2}{2t+1}\right)^8 \cdot \left(\frac{(2t+1) - 2(t-2)}{(2t+1)^2}\right)$$