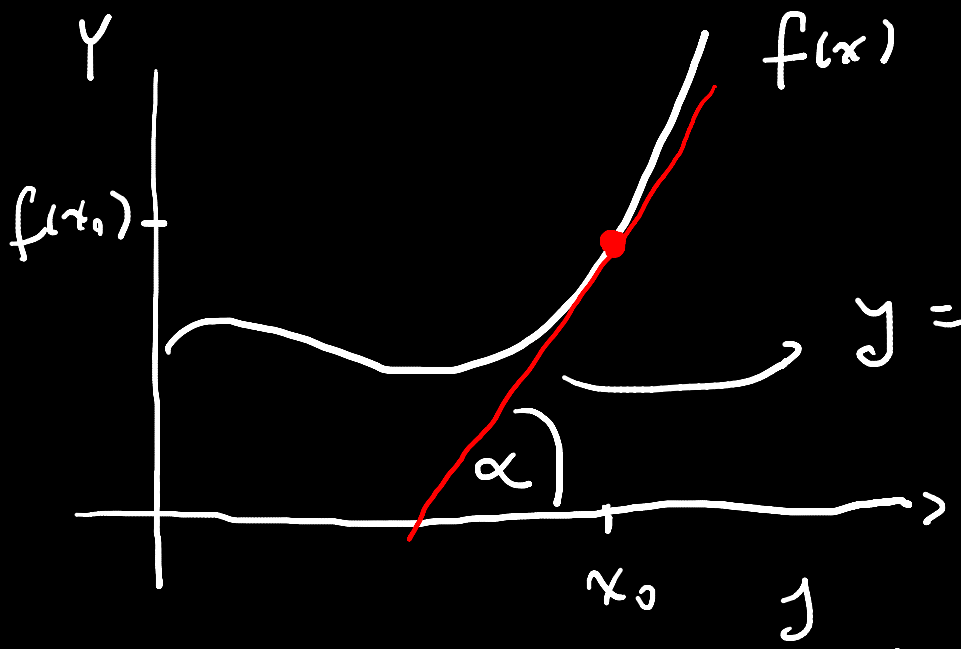
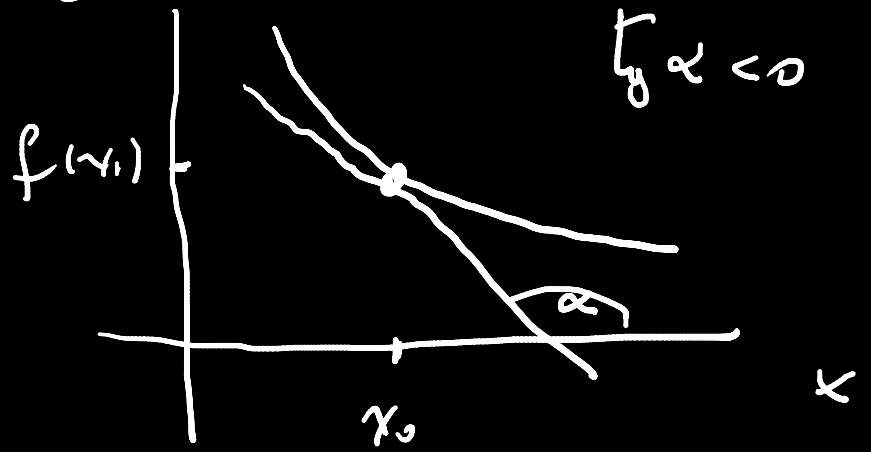
30/09/2025 DERIVADA y TANGENTE

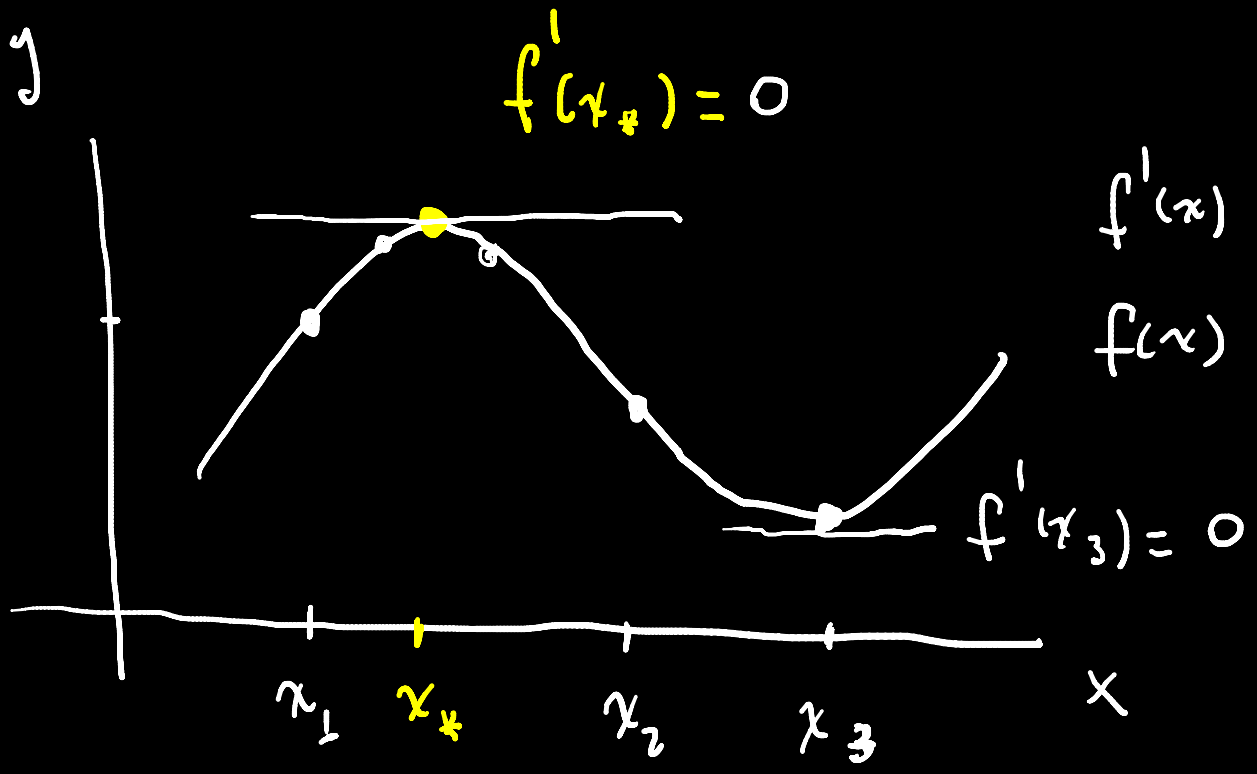


$f'(x_0)$

$y = \underbrace{f'(x_0)}_{m = \operatorname{tg}\alpha}(x - x_0) + f(x_0)$



$\operatorname{tg}\alpha < 0$



$f'(x_1) > 0$

$f'(x_2) < 0$

Ejemplo: $y = 3(x-1)^2 - 6$

$$y = 3(x^2 - 2x + 1) - 6$$

$$y = 3x^2 - 6x + 3 - 6$$

$$\boxed{y = 3x^2 - 6x - 3}$$

Sea $f(x) = 3x^2 - 6x - 3$

$$f'(x) = 6x - 6$$

Debemos resolver $f'(x) = 0$

$$6x - 6 = 0 \longrightarrow x = 1$$

Luego hacemos $f(1) = 3 \cdot 1^2 - 6 \cdot 1 - 3 = 3 - 6 - 3 = -6$

Otro ejemplo $f(x) = x^3 - 2x^2 + x - 1$

$f'(x) = 3x^2 - 4x + 1$

$3x^2 - 4 + 1 = 0$

$A = 3$
$B = -4$
$C = 1$

$Ax^2 + Bx + C = 0$ cuadrática

$$\frac{-B \pm \sqrt{B^2 - 4AC}}{2A} \quad ; \quad \frac{4 \pm \sqrt{16 - 12}}{6}$$

$$\frac{4 \pm \sqrt{4}}{6} \qquad \frac{4 \pm 2}{6}$$

$x_1 = \frac{6}{6} = 1$ ✓

$x_2 = \frac{1}{3}$ ✓

[illegible] $3x^2 - 4x + 1 = 0$

$$f(x) = x^3 - 2x^2 + x - 1$$

$x_1 = 1 \quad ; \quad x_2 = \frac{1}{3}$

$f(1) = 1^3 - 2 \cdot 1^2 + 1 - 1 = -1 \qquad (1, -1)$

$f\left(\frac{1}{3}\right) = \left(\frac{1}{3}\right)^3 - 2\left(\frac{1}{3}\right)^2 + \frac{1}{3} - 1$

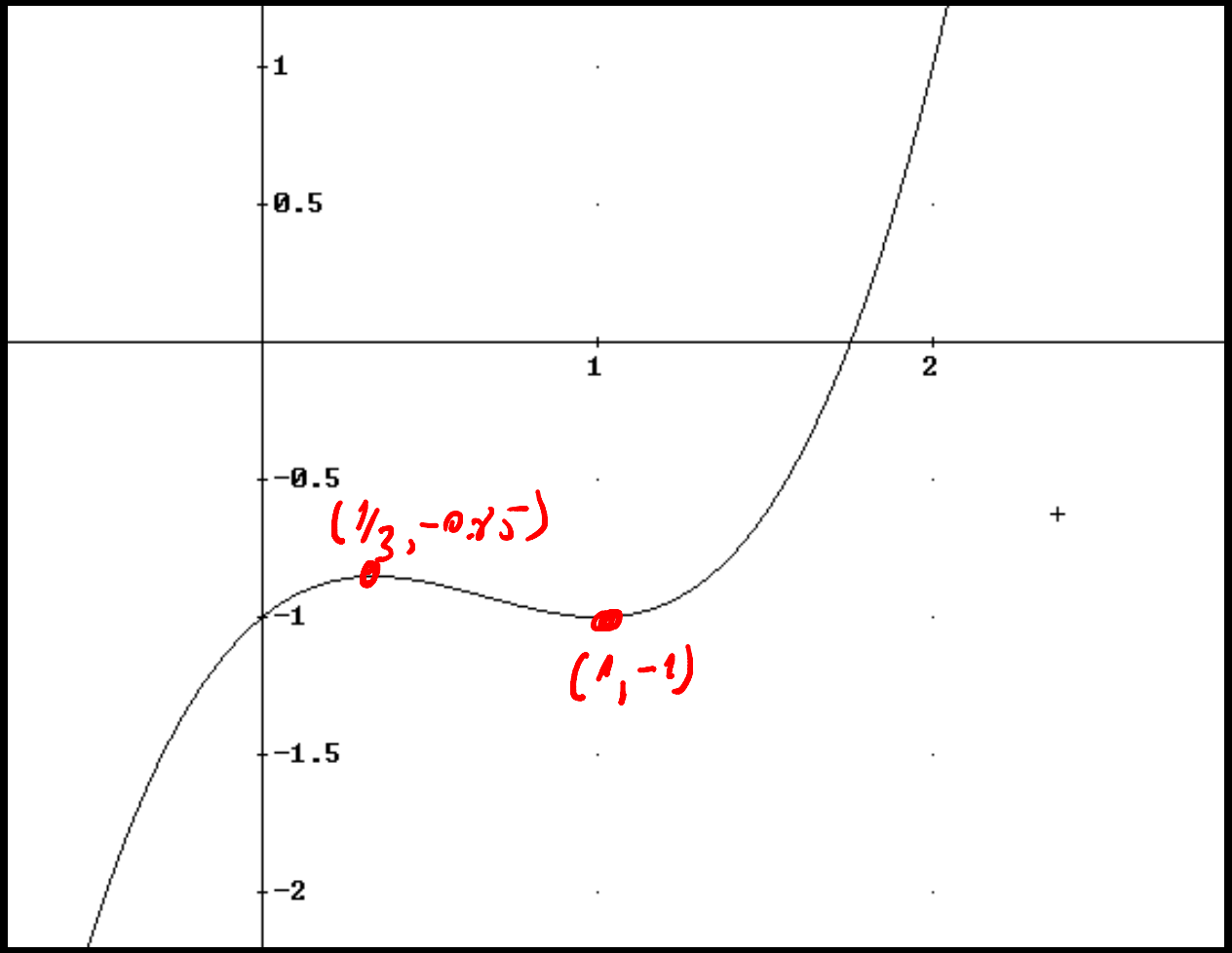
$= \frac{1}{27} - \frac{2}{9} + \frac{1}{3} - 1 = \frac{1 - 6 + 9 - 27}{27} = -\frac{23}{27}$

$f\left(\frac{1}{3}\right) \doteq -0.85$

$\left(\frac{1}{3}, -0.85\right)$

$$f(x) = x^3 - 2x^2 + x - 1$$

$$f'(x) = 3x^2 - 4x + 1$$



MÉTODO

Sea $f(x)$

1. graficamos $f(x)$
2. Calculamos $f'(x)$ ←
3. Resolvemos $f'(x)=0$
4. Obtenemos los puntos críticos
5. Evaluamos estos puntos críticos en la función $f(x)$

Es decir si x_* es un pto. crítico entonces calculamos $f(x_*)$, y así obtenemos

$$(x_*, f(x_*))$$

Tabla de derivadas

$$[f(x)+g(x)]' = f'(x) + g'(x)$$

$$[\alpha \cdot f(x)]' = \alpha \cdot f'(x)$$

$$[f(x) \cdot g(x)]' = f(x) \cdot g'(x) + f'(x) \cdot g(x)$$

$$\frac{d\,f(x)}{dx} = f'(x)$$

$$\frac{d\,(\operatorname{sen} x)}{dx} = \cos x \qquad \frac{d\,(\cos x)}{dx} = -\operatorname{sen} x$$

$$\frac{d\,e^x}{dx} = e^x$$

Regla de la Cadena

$$x^2 \longrightarrow \frac{d(x^2)}{dx} = 2x$$

$$\frac{d \operatorname{sen} x}{dx} = \cos x$$

$$\frac{d}{dx}\left[\operatorname{sen} x^2\right] = \cos x^2 \cdot 2x = 2x \cdot \cos x^2$$

$$\frac{d\, e^{3x^2}}{dx} = e^{3x^2} \cdot 6x = 6x \cdot e^{3x^2}$$

$$\frac{d}{dx}\left[e^{-x}\right] = e^{-x}(-1) = -e^{-x}$$

$$\frac{d\sqrt{x}}{dx} = \frac{d}{dx}(x^{1/2}) = \frac{1}{2}x^{\frac{1}{2}-1}$$

$$= \frac{1}{2}x^{-1/2} = \frac{1}{2x^{1/2}} = \frac{1}{2\sqrt{x}}$$

$$\frac{d\sqrt{x}}{dx} = \frac{1}{2\sqrt{x}}$$

Esempio: e^{2x^3} $\quad \frac{d\,e^{2x^3}}{dx} =$

$$= e^{2x^3} \cdot 6x^2$$

$f(x)$ $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

$f(x) = e^{-x^2}$ $f'(x) = -2x e^{-x^2}$