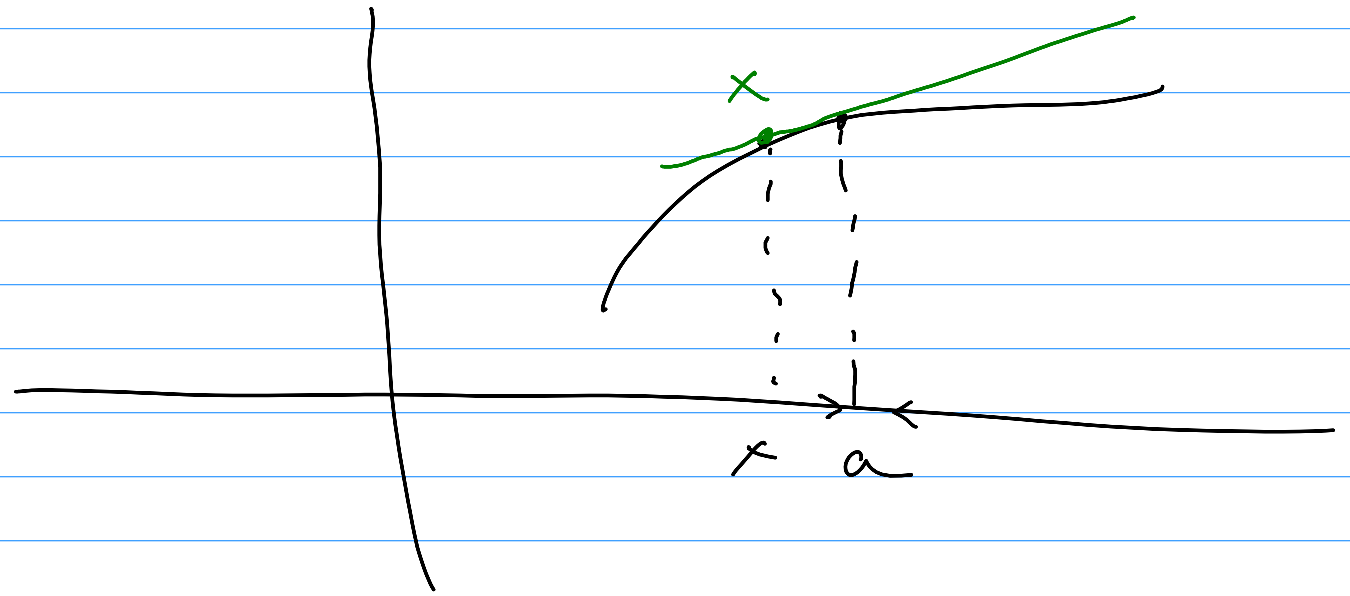
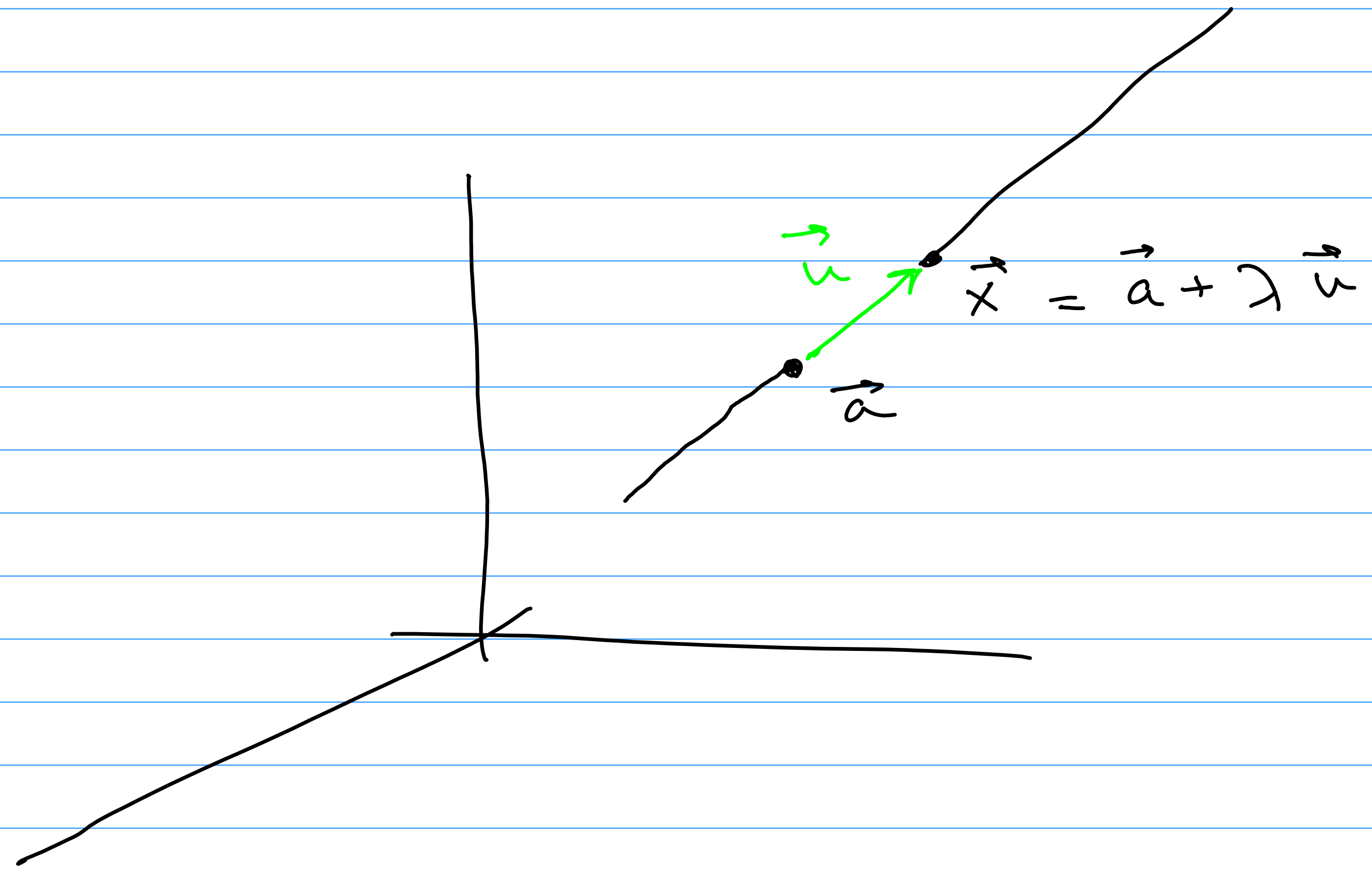
$$f(x,y) = e^{x^2+y^2}$$

$$\frac{\partial f}{\partial x} = \frac{\partial}{\partial x}\left(e^{x^2+y^2}\right) = e^{x^2+y^2}\, 2x$$

$$\frac{\partial f}{\partial y} = \frac{\partial}{\partial y}\left(e^{x^2+y^2}\right) = e^{x^2+y^2}\, 2y.$$



$$\frac{f(x)-f(a)}{x-a}$$



$$\frac{f(\vec{x})-f(\vec{a})}{\|\vec{u}\|\,\lambda}$$

$$\vec{x} - \vec{a} = \lambda \vec{u}$$

$$\|\vec{x}-\vec{a}\| = |\lambda|\,\|\vec{u}\|$$

$$\|\vec{u}\| \neq 0 \Rightarrow \|\vec{u}\| = 1$$

$$f(x,y) = \begin{cases} \dfrac{x^2 y}{x^4+y^2} & (x,y) \neq 0 \\ 0 & (x,y) = 0 \end{cases}$$

$$\frac{f(\vec{a}+\lambda\vec{u}) - f(\vec{a})}{\lambda} \qquad \vec{u} = (u_x, u_y) \qquad u_x^2 + u_y^2 = 1$$

$$\vec{a} + \lambda\vec{u} = (0\ 0) + \lambda(u_x, u_y)$$

$$D_u f(0,0) = \lim_{\lambda \to 0} \frac{\lambda^2 u_x^2\, \lambda u_y - 0}{\lambda^4 u_x^4 + \lambda^2 u_y^2} = \lim_{\lambda \to 0} \lambda \cdot \frac{u_x^2 u_y}{\lambda^2 u_x^2 + u_y^2} = 0 \qquad \frac{u_x^2 u_y}{u_y^2} = 0$$

$u_y = 0$ $\qquad \dfrac{u_x^2 \cdot 0}{\lambda^2 u_x^2} = 0$ $\qquad u_y \neq 0$

$y = mx \quad f(x, mx) \to 0 \qquad y = x^2 \qquad f(x, x^2) = 1/2$

$\nexists \lim \Rightarrow$ No es continua en $(0,0)$

$h^2 = o(h)$, $\quad \lim_{h \to 0} \dfrac{h^2}{h} = 0$

$h^3 = o(h^2) \quad \lim_{h \to 0} \dfrac{h^3}{h^2} = 0$

$$f'(a) \leftarrow \frac{f(x) - f(a)}{x-a} = \frac{L(x-a) + o(x-a)}{x-a}$$

$$= L + \frac{o(x-a)}{x-a}$$

$$f(a+h) - f(a) - (A)h \qquad A: \mathbb{R}^n \to \mathbb{R}^m$$

$$\underset{\mathbb{R}^m}{f(a+h)} \quad \underset{\mathbb{R}^m}{f(a)} \quad \underset{\mathbb{R}^n}{h}$$