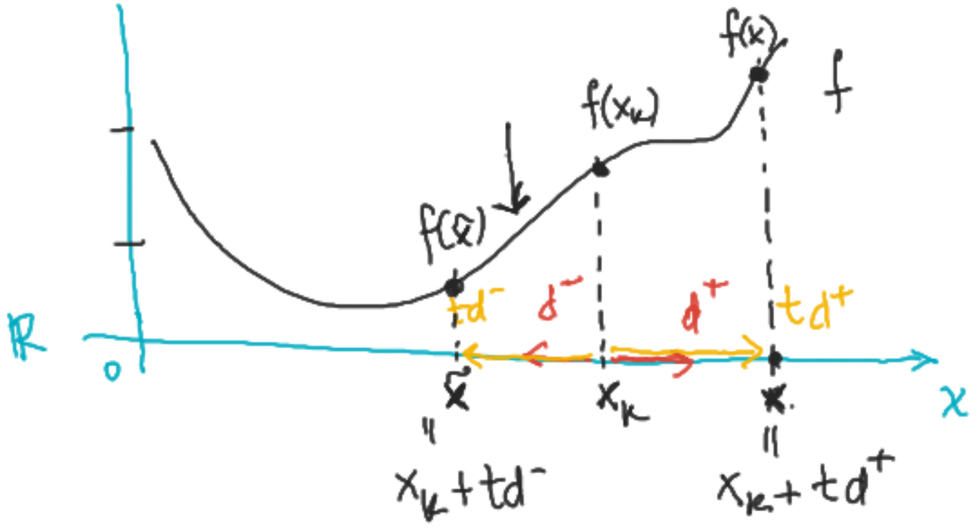
Descenso Gradiente

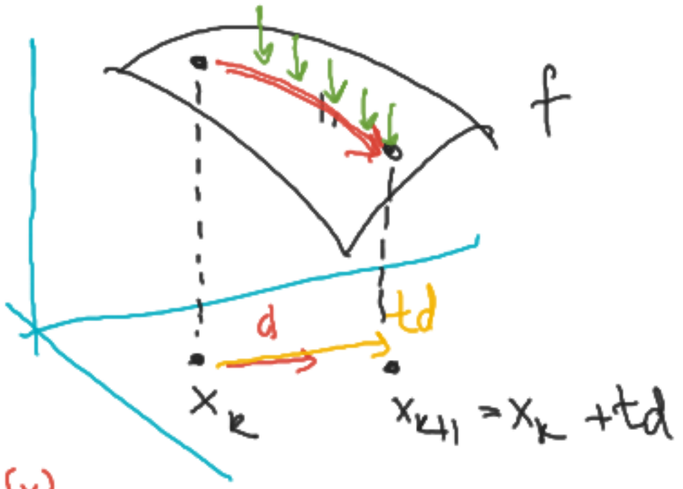
Dado $f: \mathbb{R}^n \longrightarrow \mathbb{R}$ diferenciable, $x_0 \in \mathbb{R}^n$

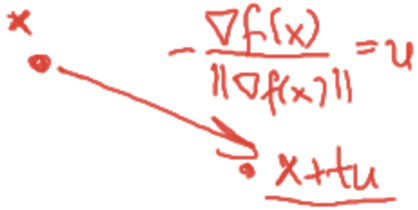
$x_1, x_2, x_3, \ldots$ aproximaciones de un mínimo local x^* de f.

$x_1, x_2, x_3, \xrightarrow{n \to \infty} x^*$

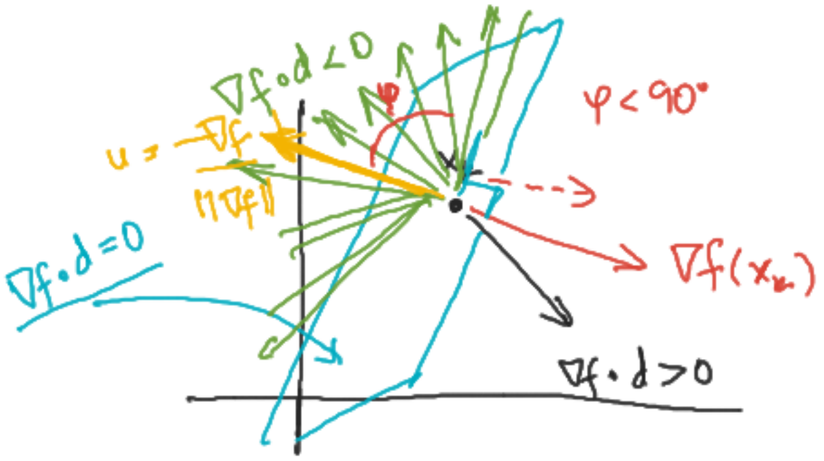
$$x_{k+1} = x_k + \alpha d_k$$







- d es dirección de descenso $\iff$ $\boxed{\nabla f(x_k) \cdot d < 0}$



$d = \frac{-\nabla f(x)}{\|\nabla f(x)\|}$ $\quad d = -\nabla f(x)$

$\nabla f(x) \cdot d = 0$

$\mathbb{R}^n$ $\quad > \quad <$

Elegir el tamaño de paso α:

Comenzar $\alpha_0 > 0$ (e.g. $\alpha_0 = 0.1$)

$0 < r < 1$ $\quad r = \frac{1}{2}$

$\alpha_1 = r\alpha_0$

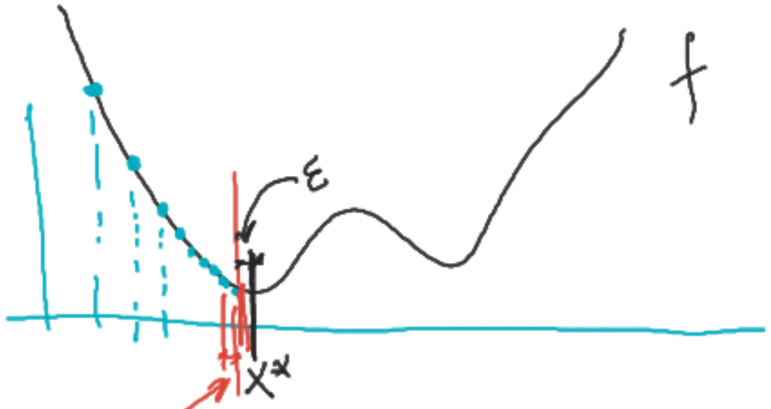
$\alpha_2 = r\alpha_1$

α_k

$\alpha_0 = 0.1$

$\alpha = 0.01$

$\alpha = 0.001$ $\quad \cdots \quad$ $\alpha = 10^{-6}$



6 dígito tiene erro

$\varepsilon = 10^{-6}$

$\varepsilon = 10^{-4}$

$\|x_{k+1} - x_k\| < \varepsilon$

ε = Tolerancia

$\|\nabla f(x_k)\| < \varepsilon$