

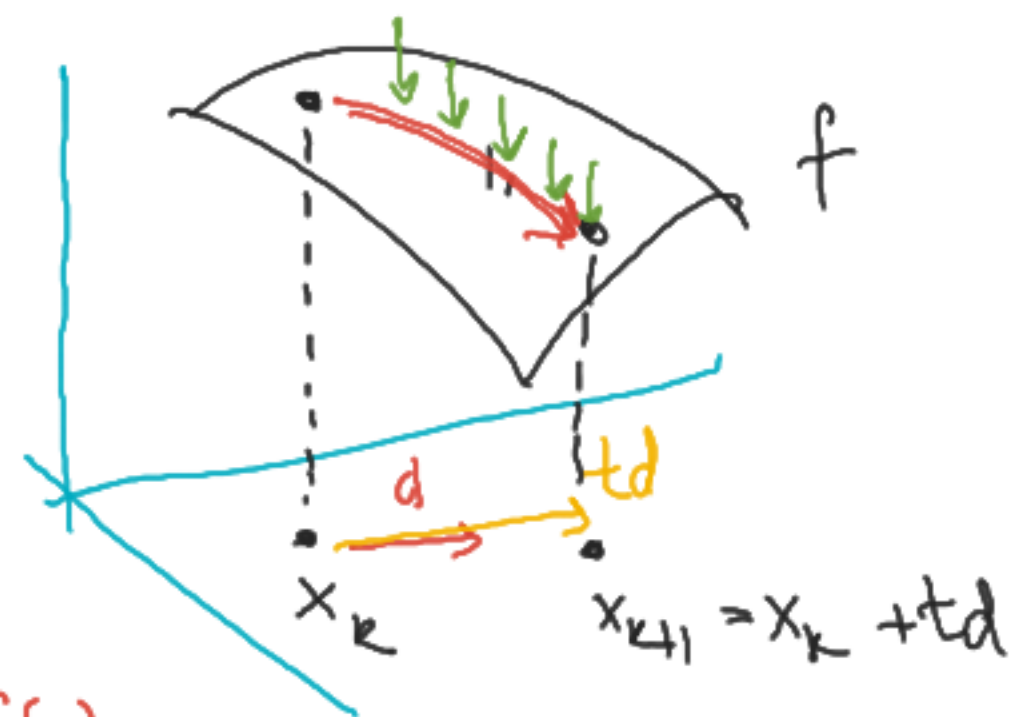
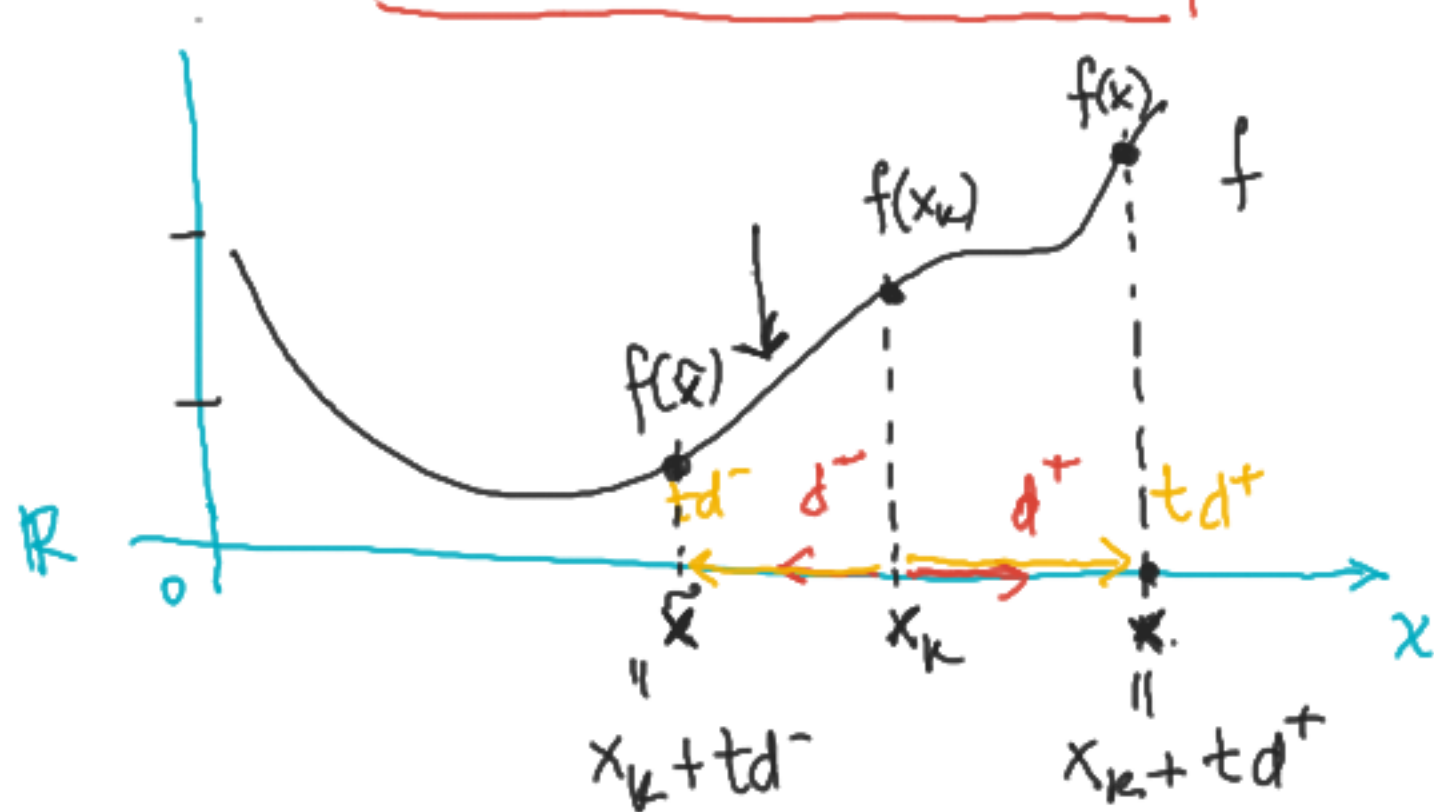
Descenso Gradiente

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

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

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

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

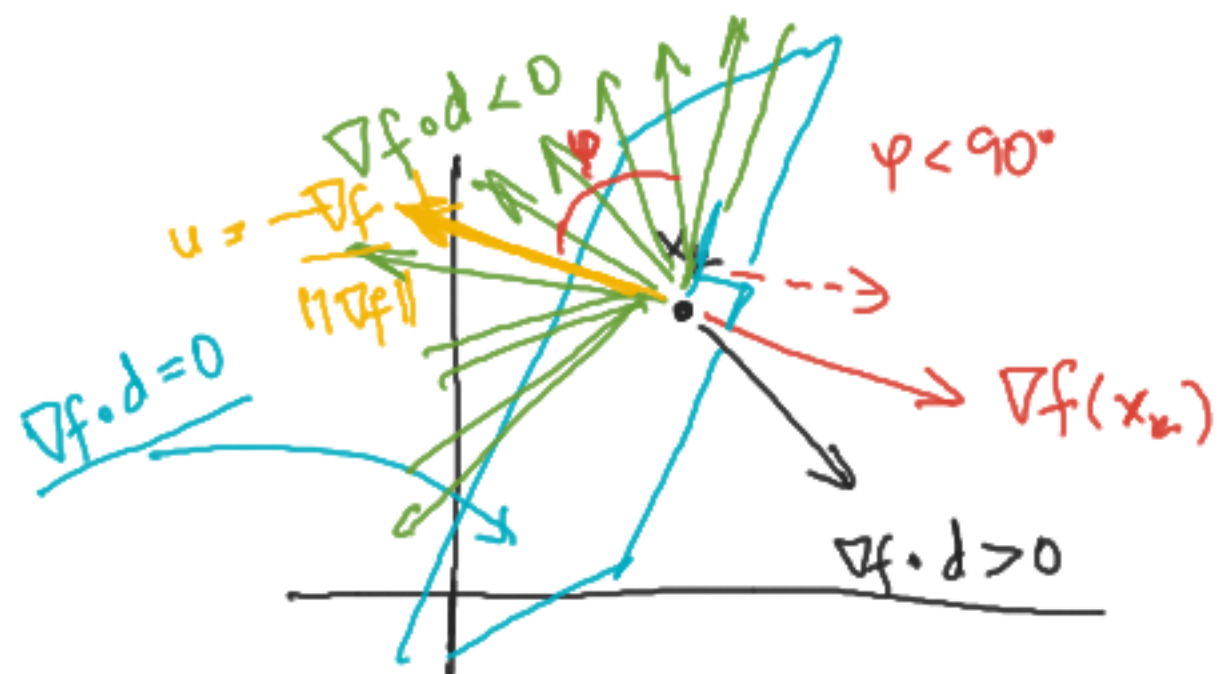


$$-\frac{\nabla f(x)}{\|\nabla f(x)\|} = u$$

A red arrow points from the vector u to a red point $x + tu$.

• d es dirección de descenso \Leftrightarrow

$$\nabla f(x_k) \cdot d < 0$$



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

$$\frac{\nabla f(x) \cdot d = 0}{\begin{matrix} > \\ < \end{matrix}}$$

Elegir el tamaño de paso α :

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

$$\alpha_1 = r \alpha_0$$

$$\alpha_2 = r \alpha_1$$

$$0 < r < 1$$

$$r = \frac{1}{2}$$

α_k ✓

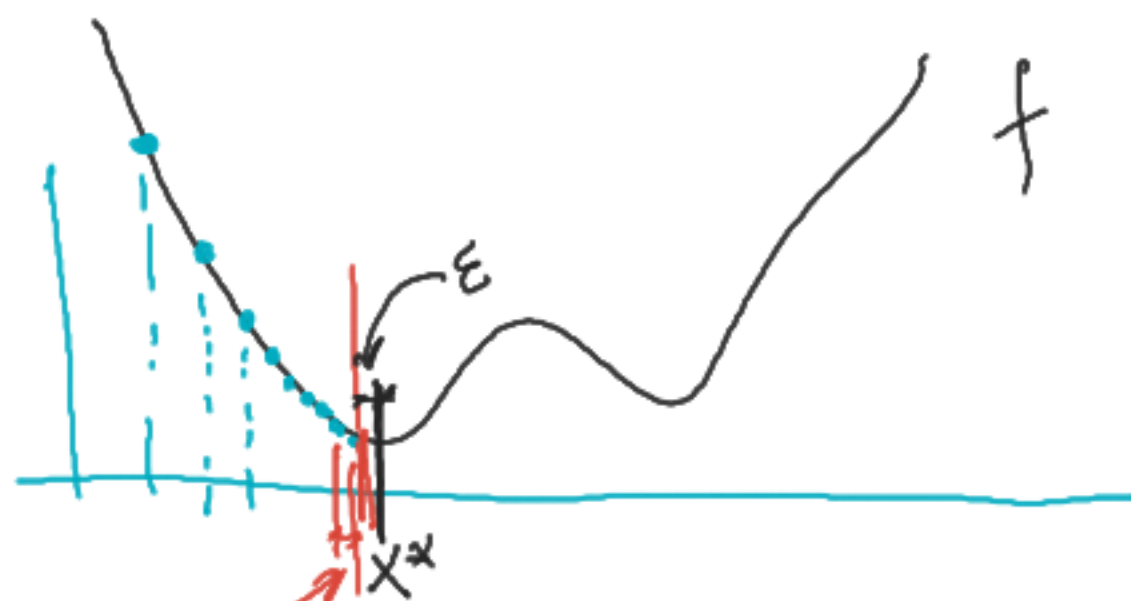
$$\alpha_0 = 0.1$$

$$\alpha = 0.01$$

$$\alpha = 0.001$$

...

$$\alpha = 10^{-6}$$



b digitos
tiene error

$$\epsilon = 10^{-6}$$

$$\epsilon = 10^{-4}$$

$\epsilon = \text{Tolerancia}$

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

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

