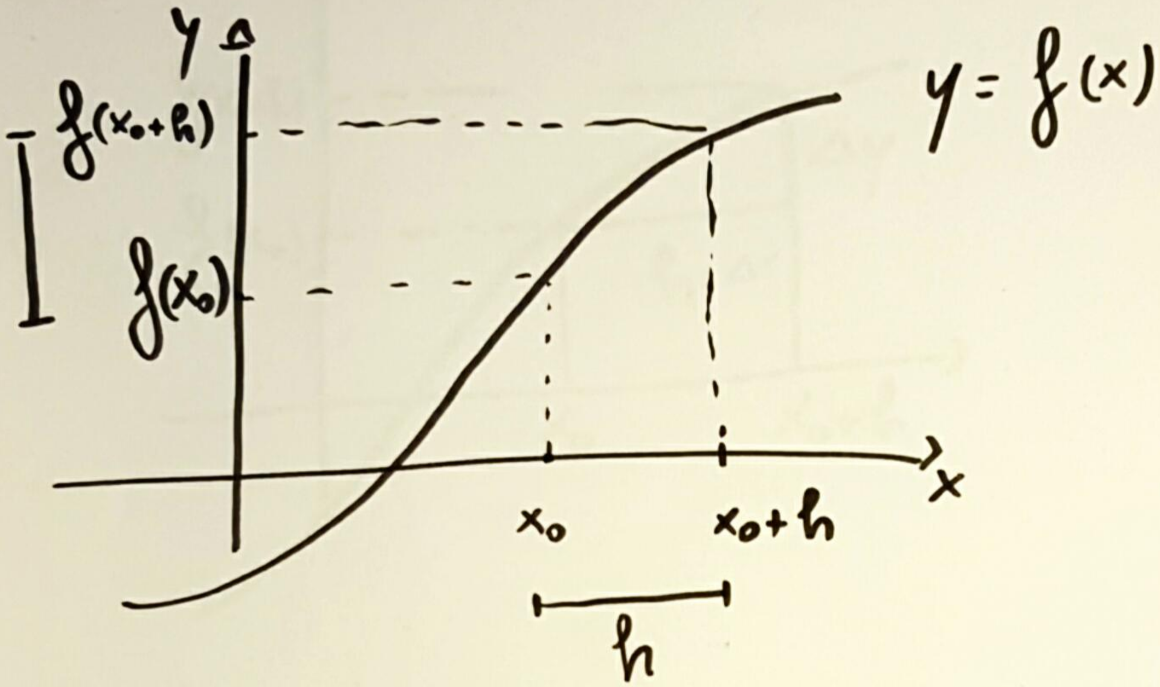
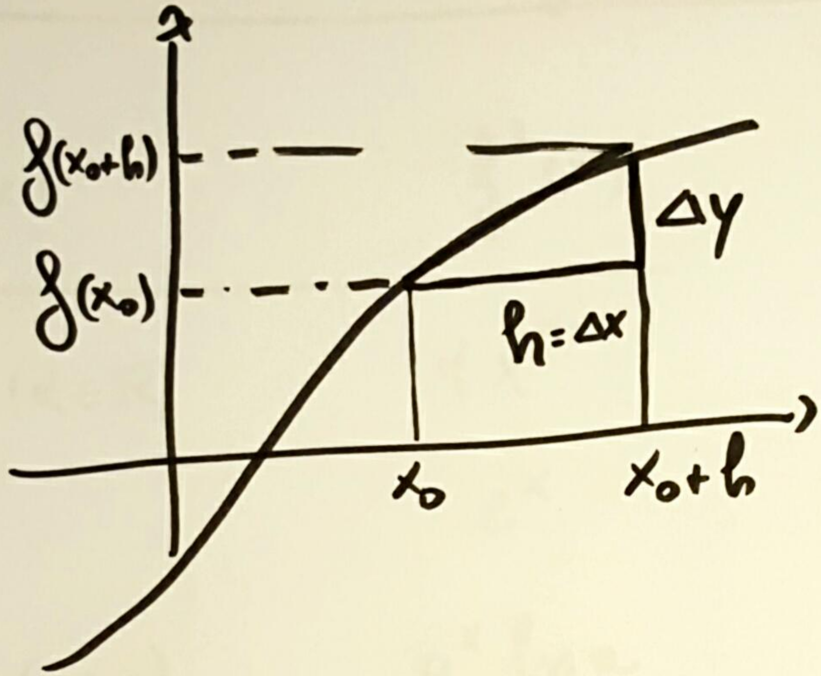
Derivate



$$\frac{f(x_0+h)-f(x_0)}{\cancel{x_0}+h-\cancel{x_0}} = \frac{f(x_0+h)-f(x_0)}{h}$$

$$\lim_{h\to 0} \frac{f(x_0+h)-f(x_0)}{h} = f'(x_0)$$



$$\frac{\Delta y}{\Delta x} = m = f'(x_0)$$

$$\underset{y}{\overset{\shortparallel}{f(x)}} - \underset{y_0}{\overset{\shortparallel}{f(x_0)}} = m\,(x - x_0)$$

fascio proprio di rette

di centro (x_0, y_0)

Derivate delle f.ni elementari

$f(x)$	$f'(x)$
$x^\alpha \quad (\alpha \in \mathbb{R})$	$\alpha x^{\alpha-1}$
e^x	e^x
$a^x \quad (a>0)$	$a^x \ln a$
$\ln x$	$\frac{1}{x}$
$\log_a x$	$\frac{1}{x} \log_a e$
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\operatorname{tg} x$	$\frac{1}{\cos^2 x}$

- $\arcsin x$ $\qquad \dfrac{1}{\sqrt{1-x^2}}$

- $\arccos x$ $\qquad -\dfrac{1}{\sqrt{1-x^2}}$

- $\operatorname{arctg} x$ $\qquad \dfrac{1}{1+x^2}$

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- $g(x) \cdot h(x)$ $\qquad g'(x)\,h(x) + g(x)\,h'(x)$

- $\dfrac{g(x)}{h(x)}$ $\qquad \dfrac{g'(x)\,h(x) - g(x)\,h'(x)}{[h(x)]^2}$

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- $g(h(x))$ $\qquad g'(h(x)) \cdot h'(x)$

Esempi

$f(x)$	$f'(x)$
x^6	$6x^5$
e^x	e^x
3^x	$3^x \ln 3$
$\ln x$	$\frac{1}{x}$
$\log_3 x$	$\frac{1}{x} \log_3 e$
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\operatorname{tg} x$	$\frac{1}{\cos^2 x}$

- $\arcsin x$ $\qquad \dfrac{1}{\sqrt{1-x^2}}$

- $\arccos x$ $\qquad -\dfrac{1}{\sqrt{1-x^2}}$

- $\operatorname{arctg} x$ $\qquad \dfrac{1}{1+x^2}$

- $\sin x \cdot \ln x$ $\qquad \cos x \cdot \ln x + \sin x \cdot \dfrac{1}{x}$

- $\dfrac{\sin x}{\ln x}$ $\qquad \dfrac{\cos x \cdot \ln x - \sin x \cdot \frac{1}{x}}{[\ln x]^2}$

- $\sin(\ln x)$ $\qquad \cos(\ln x) \cdot \dfrac{1}{x}$

Una f.ne $f: (a,b) \to \mathbb{R}$

è derivabile in $x_0 \in (a,b)$ se e solo se $f'_+(x_0)$ e $f'_-(x_0)$ esistono finiti e sono uguali fra loro.

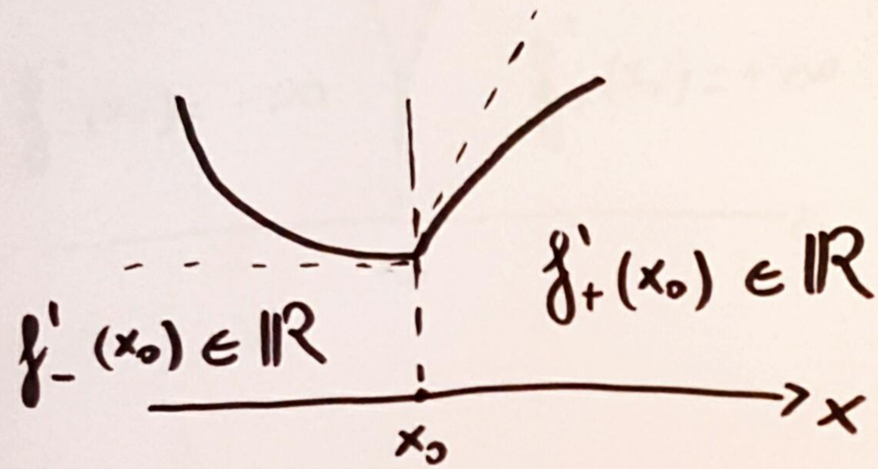
Se $f'_+(x_0) \neq f'_-(x_0)$ allora:

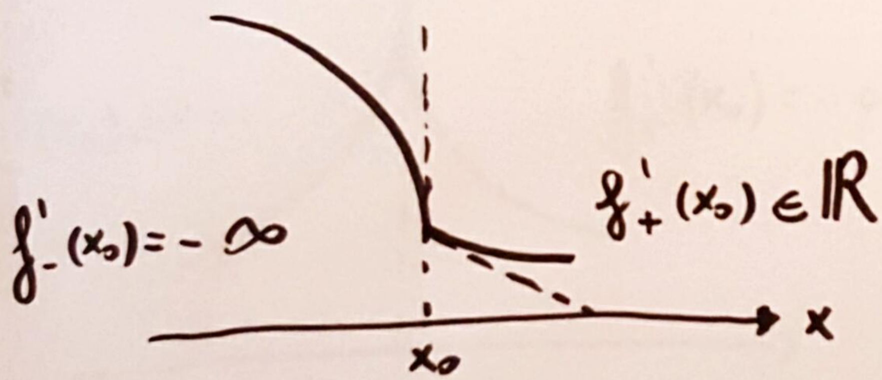
1) se almeno uno dei due esiste finito, il pto $(x_0, f(x_0))$ si dice pto angoloso.

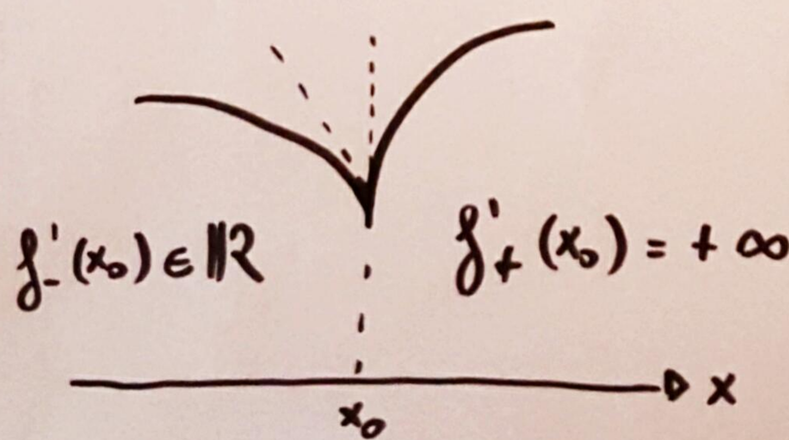
2) se $f'_+(x_0) = +\infty$ e $f'_-(x_0) = -\infty$, o viceversa, il pto $(x_0, f(x_0))$ si dice cuspide.

Esempi

- Punto Angoloso







• Cuspide