



Definition

Suppose $f : \mathbf{R}^n \rightarrow \mathbf{R}$. Given $a \in \mathbf{R}^n$ and $\delta \in \mathbf{R}^n$, if the limit

$$\lim_{t \rightarrow 0} \frac{f(a + t\delta) - f(a)}{t}$$

exists, then we say that f is *differentiable at a in the direction x* . We call the value of the limit the *directional derivative* of f at a , in the direction δ .

Notation

We denote the directional derivative of f at a by $D_x f(x)$.

