Gradient and Hessian

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Differentiable function

Definition

A function f is said to be differentiable at $x \in \mathbb{R}^n$ if there exists $u \in \mathbb{R}^n$ such that

$$f(x+h) = f(x) + \langle u,\, h\rangle + o(\|h\|) \qquad u \text{ is called } \textbf{the} \text{ gradient } u = \nabla f(x)$$