

MATH 23b, SPRING 2003
THEORETICAL LINEAR ALGEBRA
AND MULTIVARIABLE CALCULUS
Lectures # 7, supplement

The Definition of Differentiability

Let $f : \mathbb{R}^n \longrightarrow \mathbb{R}$.

We say f is **differentiable at** $\mathbf{a} \in \mathbb{R}^n$ provided that there exists a linear map $L : \mathbb{R}^n \longrightarrow \mathbb{R}$ such that

$$0 = \lim_{\|\mathbf{h}\| \rightarrow 0} \frac{f(\mathbf{a} + \mathbf{h}) - f(\mathbf{a}) - L(\mathbf{h})}{\|\mathbf{h}\|}.$$

We call L the differential of f at \mathbf{a} and denote it by: $df_{\mathbf{a}} = L$.