



HIGHER ORDER DERIVATIVES

Why

The second derivative (if it exists) is the derivative of the derivative of a function. Can we continue in this way?

Definition

Let $A \subset \mathbf{R}$. Let $f : A \rightarrow \mathbf{R}$ be twice differentiable. We call f *three times differentiable* (or *thrice differentiable*) if its second derivative is differentiable. We call the derivative of the second derivative of f the *third derivative* of f .

Generally, for $n \geq 3$, we call f *$n+1$ -times differentiable* if f is n -times differentiable. The *$n+1$ th derivative* of a $n+1$ -times differentiable function is the derivative the n th derivative of the function.

Notation

The n th derivative of a function $f : A \rightarrow \mathbf{R}$ is sometimes denoted $f^{(n)} : A \rightarrow \mathbf{R}$.

