Real Analysis I: Differentiation

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1 Derivative of a Real Function

- Let $f : [a, b] \to \mathbb{R}$ and let $c \in [a, b]$. f is said to be differentiable at c if and only if $\lim_{x \to c} \frac{f(x) - f(c)}{x - c}$ exists. In this case, this we say that f is differentiable at c, the limit is called the derivative of f at c and denoted $f'(c)$. Thus $f'(x)$ is called the derivative of f. Its domain is the set of points at which the limit exists.
- If $f'(x)$ is differentiable at every point in $E \subseteq [a, b]$, then we say that f is differentiable on E.
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2 Mean Value Theorems

3 Continuity of Derivatives

4 L'Hopital's Rule

5 Taylor's Theorem

6 Differentiation of Vector-Valued Functions