Rolle's Theorem

Let f be a function that satisfies the following hypotheses:

- f is continuous on the closed interval [a,b]
- f is differentiable on the open interval (a,b)
- f(a) = f(b)

Then there is a number c in (a,b) such that f′(c) =0

The Mean Value Theorem

Let f be a function that satisfies the following hypotheses:

- f is continuous on the closed interval [a,b]
- f is differentiable on the open interval (a,b)

Then there is a number c in (a,b) such that $f'(c) = \frac{f(b) - f(a)}{b - a}$

or equivalently $f(b) - f(a) = f'(c)(b - a)$

Constant Functions

- if f'(x)=0 for all x in an interval (a,b), then f is constant on (a,b)
- if f'(x)=g'(x) for all x in an interval (a,b), then f-g is constant on (a,b)

  i.e. $(\forall x \in (a,b),\ f'(x)=g'(x)) \Rightarrow \exists c \in \mathbb{R},\ \forall x \in (a,b),\ f(x)=g(x)+c$