Rolle's Theorem Proof

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Rolle's theorem stated that if $f(x)$ in continuous on an interval $[a, b]$, differentiable on (a, b) and $f(a) = f(b) = 0$, the there exists at least one c in (a, b) where $f'(c) = 0$. The proof can be separated into two cases with Case 1 being $f(x) = 0$, then it's obvious that the statement holds true. Case 2 of the theorem can be solved by given the extreme value theorem, there exists an extrema at $x = c$ in (a, b), which Fermat's theorem told us that $f'(c) = 0$. QED