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Say we are using Newton's method to minimize a function $g(x)$. Assuming $g^{\prime}\left(x_{k}\right) \neq 0$ and $g^{\prime \prime}\left(x_{k}\right)>0$ (and that the third derivatives exist and are bounded), argue that there is some sufficiently small $\alpha_{k}>0$ such that $g\left(x_{k+1}\right)<g\left(x_{k}\right)$.

