Suppose that $f : [a, b] \rightarrow \mathbb{R}$ is differentiable at $c \in (a, b)$, and let $f'(c) = \lim_{h \to 0} \frac{f(c+h) - f(c)}{h}$. Suppose that $q \in \mathbb{R}$ with $q \neq f'(c)$; prove that there does NOT exist a function $\epsilon : [a, b] \rightarrow \mathbb{R}$ such that both

$$f(x) = f(c) + q(x - c) + \epsilon(x)$$

and

$$\lim_{x \to c} \frac{\epsilon(x)}{x - c} = 0.$$