

**August 2008, Problem 4** Let  $f$  be a differentiable function on  $\mathbb{R}$ . Assume that there is no  $x$  such that  $f(x) = 0 = f'(x)$ . Show that the set

$$S = \{x \in [0, 1] : f(x) = 0\}$$

is finite.