Chapter 4

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Theorem 1. *Suppose f is a real function defined on $\mathbb{R}$ which statisfies*

$$\lim_{h \to 0}[f(x + h) - f(x - h)] = 0$$

for every real number x. Does this imply that f is continuous?

Proof. No, the function $f(x) = x^2$ if $x \neq 0$ and $f(0) = 1$. This function is discontinuous at 0. $\square$