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4/8/25

Let $a < c < b$, $a, b, c \in \mathbb{R}$.

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

$$\therefore f'(c) \neq 0, \Rightarrow f(b) - f(a) \neq 0$$

$$\therefore f(a) \neq f(b)$$