

QUESTION 1

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Consider a continuous function f defined on the interval $[0, 1]$ such that $f(0) = 0$ and $f(1) = 1$.

(a) Intermediate Value Theorem

Use the Intermediate Value Theorem to show that there exists a point c in the interval $(0, 1)$ such that $f(c) = \frac{1}{2}$.

(b) Mean Value Theorem and Rolle's Theorem

Let f be a function defined on the interval $[0, 1]$ such that $f(0) = 0$ and $f(1) = 1$. Suppose that f is differentiable on $(0, 1)$ and that $f'(c) = 1$ for some c in $(0, 1)$. Use the Mean Value Theorem to show that $f(1) = 1$.

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