

MEAN VALUE THEOREM

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Name: _____

Theorem (Mean Value). *Let f be a function that satisfies the following hypotheses:*

- (1) f is continuous on the closed interval $[a, b]$.*
- (2) f is differentiable on the open interval (a, b) .*

Then there is a number c in (a, b) such that

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

or, equivalently,

$$f(b) - f(a) = f'(c)(b - a).$$

In Problems 1 through 4, verify that the function satisfies the hypotheses of the Mean Value Theorem on the given interval and find all numbers c that satisfy its conclusion.

1. $f(x) = x^3 - x^2 - 6x + 2$, $[0, 3]$

2. $f(x) = \cos(2x)$, $[\pi/8, 7\pi/8]$

3. $f(x) = 3x^2 + 2x + 5$, $[-1, 1]$

4. $f(x) = \frac{x}{x+2}$, $[1, 4]$