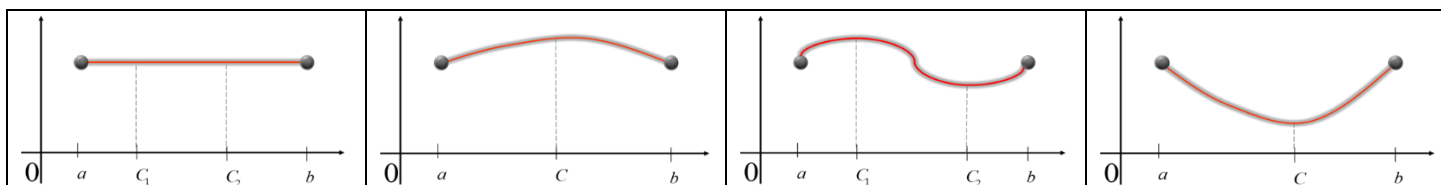


§3.2: Mean Value Theorem

“I WILL ...

...apply the Mean Value Theorem to find the derivative of a point on a graph equals to the slope of two points.”



I. Mean Value Theorem

- A. Mean Value Theorem states that if $f(x)$ is defined and _____ on the interval _____ and _____ on the interval _____, then there is at least one number c in the interval _____ (that is $a < c < b$).
- B. Equation: _____ = _____
- C. If f is _____ on the closed interval _____
- D. If f is _____ on the open interval _____ then there exists a number c in _____ such that $f'(c)$ is instantaneous rate of change
- E. _____ is average rate of change
- F. _____ is the slope of tangent line
- G. _____ is the slope of the secant line

Ex 1: Given the function $f(x) = x(x^2 - x - 2)$ on the interval $[-1, 1]$. Show that the Mean Value Theorem applies and find the c that the theorem guarantees.

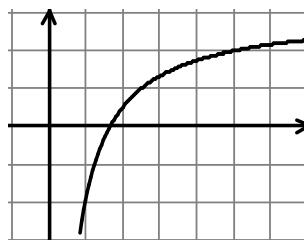
Ex 2: Given the function $f(x) = x^2 - x - 6$ on the interval $[-2, 3]$. Show that the Mean Value Theorem applies and find c that the theorem guarantees.

Ex 3: Given the function $f(x) = \frac{6}{x^2}$ on the interval $[-2, 3]$. Show that the Mean Value Theorem applies and find the c that the theorem guarantees.

Your Turn: Given the function $f(x) = 3 - \frac{5}{x}$ on the interval $[1, 5]$.

(a) The graph of $f(x)$ is given. Estimate the point c where the MVT applies.

(b) Show that the Mean Value Theorem applies and find the c that the theorem guarantees.



MEAN VALUE THEOREM

EXTREME VALUE THEOREM

INTERMEDIATE VALUE THEOREM

AP1) Let f be a function that is differentiable on the interval $(1, 10)$. If $f(2) = 5$, $f(5) = 5$ and $f(9) = 5$, which of the following must be true?

- I. f has at least two zeros
- II. The graph of f has at least one horizontal tangent line.
- III. For some c , $2 < c < 5$, $f(c) = 3$.

(A) I only. (B) I and III only. (C) II and III only. (D) I, II, and III.

Vocabulary	Connections and Process	Answer and Justifications