Notes: Rolle's Theorem & Mean Value Thm.     Day 1 Curve Sketching

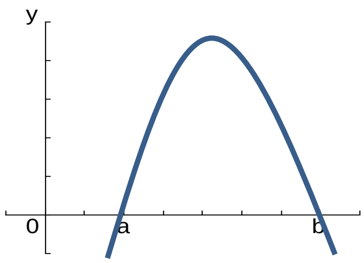
Rolle's Theorem: Let $f$ be a function that satisfies the following three hypothesis:

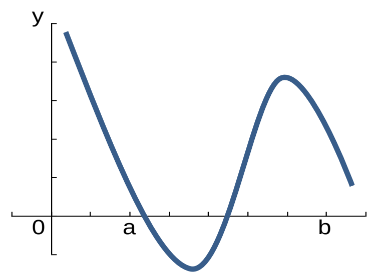
1. $f$ is continuous on the closed interval $[a, b]$.
2. $f$ is differentiable on the open interval $(a, b)$.
3. $f(a) = f(b)$

Then there exists a number $c$ in $(a, b)$ such that $f'(c) = 0$.

AD 1

**Rolle's Theorem**




Example One: Verify that the function satisfies the three hypothesis of Rolle's Theorem on the given interval. Then find all numbers c that satisfy the conclusion of Rolle's Thm.

A.) $f(x) = x^4 - x^2$ on $[-2,2]$

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

Notes: Rolle's Theorem & Mean Value Thm. Day 1 Curve Sketching

<u>**Mean Value Theorem**</u>: Let $f$ be a function that satisfies the following hypothesis:

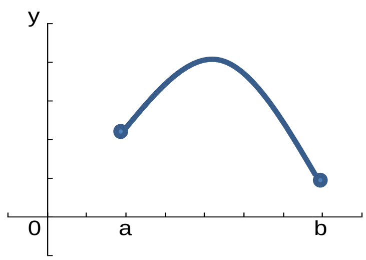
AD 2

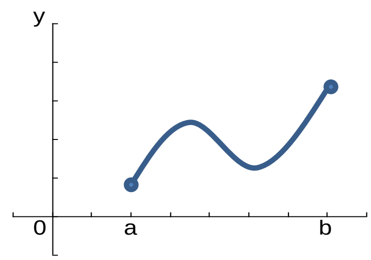
Mean Value Thm.

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

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

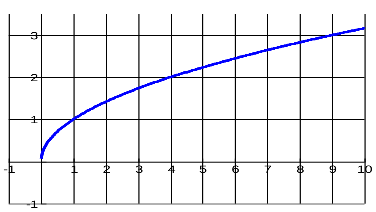
$f'(c) = \frac{f(b)-f(a)}{b-a}$ Or $f(b) - f(a) = f'(c)(b - a)$



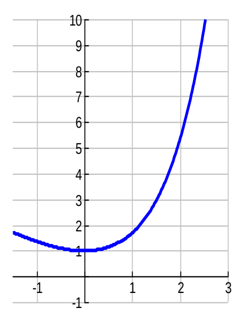




Example(s) Two: Find a point $c$ satisfying the conclusion of the $MVT$ for the given function and the interval:

A. $f(x) = \sqrt{x}$ $(1,9)$



B. $f(x) = e^x - x$ $(-1,1)$



Example Three: Find a point $c$ satisfying the conclusion of the $MVT$ for the given function and the interval:

$f(x) = x^3 - x$ on $[0,2]$