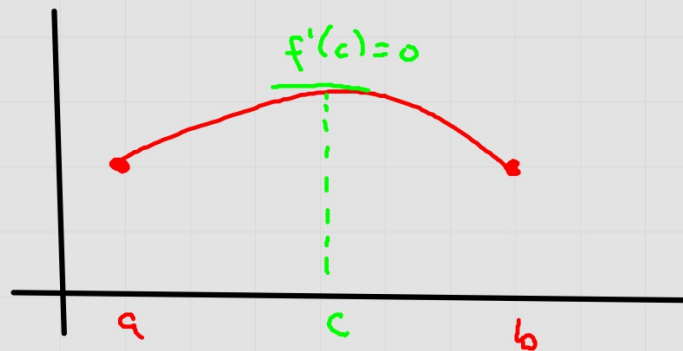


The Mean Value Theorem

Rolle's Thm

If f is cont $[a,b]$ and diff on (a,b)
and if $f(a) = f(b)$ then $\exists$ a $c \in (a,b)$
such that $f'(c) = 0$.



Given $f(x) = x^3 + x^2 - 2x + 1$ on $[-2, 0]$. Verify that R.T. holds for f and then find the c that satisfies the conclusion of R.T.

f is cont on $[-2, 0]$ and f is diff on $(-2, 0)$
and $f(-2) = f(0) = 1 \therefore$ RT holds.

$$f'(x) = 3x^2 + 2x - 2$$

$$f'(x) = 0 \rightarrow x = -1.215 \text{ or } x = .549$$

Since $.549 \notin (-2, 0)$, $c = -1.215$ only.

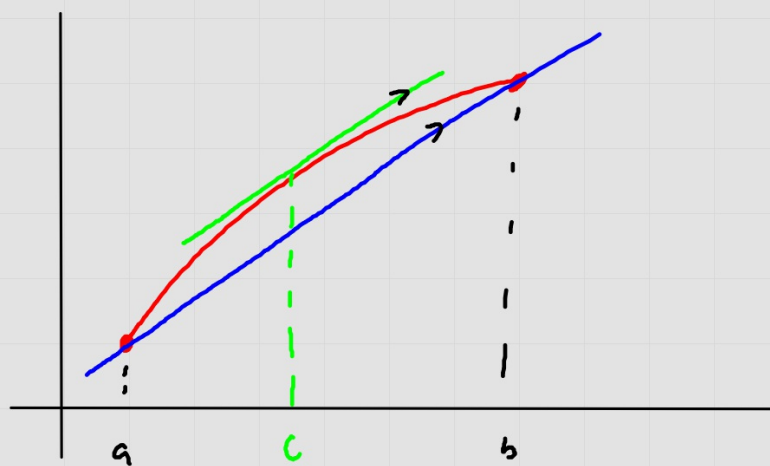
Mean Value Thm

If f is cont $[a,b]$ and diff on (a,b)
then $\exists c \in (a,b)$ such that

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

Inst. rate
of change in
fun val.
at $x=c$.

avg. rate
of change
in fun val.
on $[a,b]$



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

$$f'(x) = 6x^2 + 2x - 1$$

$$6x^2 + 2x - 1 = \frac{f(2) - f(0)}{2 - 0}$$

$$6x^2 + 2x - 1 = 9 \rightarrow x = -1.468 \text{ or } x = 1.135$$

Since $-1.468 \notin (0, 2)$, $c = 1.135$ only.