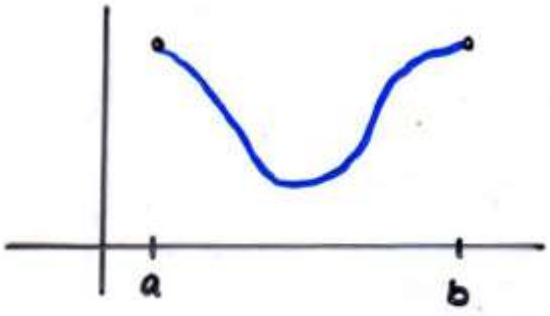
Rolle's Theorem and the Mean Value Theorem(MVT)

w-up: Find the average rate of change of $f(x)=3x^3-2x+4$ over [0,3]

Rolle's Theorem

Let f be continuous on a closed interval [a,b] AND differentiable on (a,b). If $f(a) = f(b)$ then there is at least one number c on (a,b) such that $f'(c)=0$.



Since ***differentiable***, the turn MUST happen at a horizontal tangent!

EX) Determine if Rolle's Theorem applies and if so, find all values for "c" such that $f'(c)=0$

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

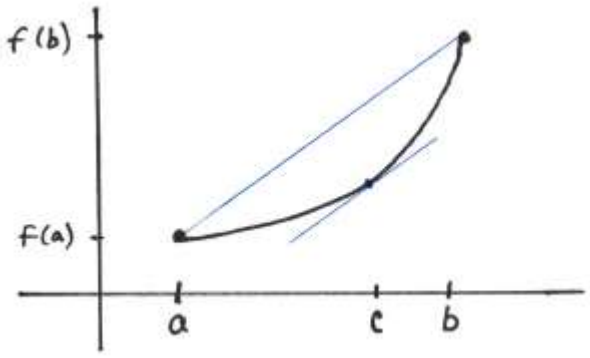
B) $f(x)=\dfrac{x}{x^2-2}$ over [-1,2]

The Mean Value Theorem (MVT)

If f is continuous on a closed interval [a,b] AND differentiable on (a,b) then there exists a number "c" on (a,b) such that:

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

"Instantaneous ROC" = "Average ROC"



EX) Determine if the Mean Value Theorem applies and if so, find all values for "c" such that $f'(c)=\frac{f(b)-f(a)}{b-a}$

A) $f(x)=x^3-x^2-2x$ over [-1,1]

B) $f(x)=x^{2/3}$ over [-1,8]