MAT137 - Calculus with proofs

- Assignment #4 due on November 26
- Test 2 opens on December 4
- Assignment #5 due on December 20

- TODAY: Rolle's Theorem

- MONDAY: MVT **(Videos 5.7, 5.8, 5.9)**

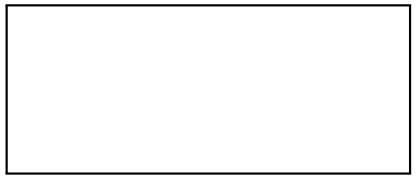
True or False – Local extrema

Let I be an interval. Let f be a function defined on I. Let $c \in I$. Which implications are true?

1. IF f has local extremum at c, THEN f has an extremum at c
2. IF f has an extremum at c, THEN f has local extremum at c

3. IF f has a local extremum at c, THEN $f'(c) = 0$.
4. IF $f'(c) = 0$, THEN f has a local extremum at c.

Local extrema - The correct implications

1. extremum $\Longrightarrow$ local extremum OR 

2. local extremum $\Longrightarrow$ derivative is 0 OR 

How many zeroes?

Let $f(x) = e^x - \sin x + x^2 + 10x$.
How many zeroes does f have?

The second Theorem of Rolle

Complete statement for this theorem and prove it.

Rolle's Theorem 2

Let $a < b$. Let f be a function defined on $[a, b]$.
IF

- (Some conditions on continuity and derivatives)
- $f(a) = f'(a) = 0$
- $f(b) = 0$

THEN $\exists c \in (a, b)$ such that $f''(c) = 0$.

Hint: Apply the 1st Rolle's Theorem to f, then do something else.