Calculus AB

3-2
(Day 1 and Day 2)

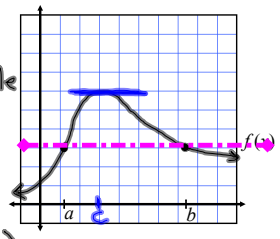
Rolle's Theorem, Mean Value Theorem

Rolles Theorem-

If 1) F(x) is continuous on [a, b]

2) F(x) is differentiable on (a, b)

3) F(a) = F(b)



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

Determine whether Rolle's Theorem can be applied to *f* on the closed interval $[a,b]$. IF Rolle's Theorem can be applied, find all values of *c* in the open interval (a,b) such that $f'(c) = 0$. (pg 176)

12) $f(x) = x^2 - 5x + 4, \quad [1,4]$ $\quad F'(x) = 2x - 5$

a) continuous? yes
b) differentiable? yes
c) F(1) = F(4)? Yes

F(1) = 0
F(4) = 0

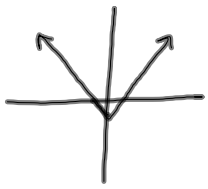
$C = \frac{5}{2}$

$F'(c) = 0$
$2c - 5 = 0$
$2c = 5$
$c = \frac{5}{2}$

Determine whether Rolle's Theorem can be applied to *f* on the closed interval $[a,b]$. IF Rolle's Theorem can be applied, find all values of *c* in the open interval (a,b) such that $f'(c) = 0$.

25) $f(x) = |x| - 1, \quad [-1,1]$

1) continuous
2) differentiable?
No, at x = 0



Thus Rolle's Theorem does not apply!

(Minimum)
Assignment:

Pg. 176
1-23 odd

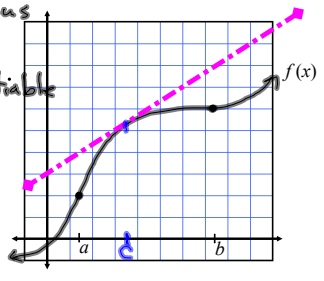
Continue with Lecture if time permits!

Mean Value Theorem -

If 1) F(x) is continuous on [a, b]

2) F(x) is differentiable on (a, b)

Then there exists $c \in (a,b)$ such that $\frac{F(b) - F(a)}{b - a} = F'(c)$



Determine whether the Mean Value Theorem can be applied to *f* on the closed interval $[a,b]$. If the Mean Value Theorem can be applied, find all vaues of *c* in the open interval (a,b) such that $f'(c) = \frac{f(b) - f(a)}{b - a}$.

44) $f(x) = \frac{x+1}{x}$, [-1, 2]

cont? not at 0

can't do

42) $F(x) = x^4 - 8x$ [0, 2]

cont? yes

diff? yes

$F'(x) = 4x^3 - 8$

$F(2) = 24$

$F(0) = -8$

$F'(c) = \frac{24-(-8)}{2-0} = \frac{32}{2} = 16$

$4c^3 - 8 = 16$

$4c^3 = 24$

$c^3 = 6$

$c = \sqrt[3]{6}$

Assignment:

Pg. 172

39-47 all

59, 65