CRITICAL NUMBERS:

THE VALUES OF X THAT ARE IN THE DOMAIN OF $f(x)$ AND OCCUR WHEN $f'(x)=0$ AND $f'(x)$ IS UNDEFINED.

TO FIND CRITICAL NUMBERS:

(1) FIND $f'(x)$

(2) SOLVE $f'(x)=0$ FOR X

(3) DETERMINE WHEN $f'(x)$ IS UNDEFINED.

THE EXTREME VALUE THEOREM:

IF f IS A CONTINUOUS FUNCTION OVER THE CLOSED, BOUNDED INTERVAL $[a,b]$, THEN THERE IS A POINT IN $[a,b]$ AT WHICH f HAS AN ABSOLUTE MAXIMUM OVER $[a,b]$, AND THERE IS A POINT IN $[a,b]$ AT WHICH f HAS AN ABSOLUTE MINIMUM OVER $[a,b]$.

ROLLE'S THEOREM:

IF $\overbrace{f \text{ IS CONTINUOUS OVER } [a,b]}^{(1)}$, $\overbrace{\text{DIFFERENTIABLE OVER } (a,b)}^{(2)}$, AND IF $\overbrace{f(a)=f(b)}^{(3)}$, THEN THERE EXISTS AT LEAST ONE c IN (a,b) SUCH THAT $f'(c)=0$.

THE MEAN VALUE THEOREM:

IF $\overbrace{f \text{ IS CONTINUOUS OVER } [a,b]}^{(1)}$ AND $\overbrace{\text{DIFFERENTIABLE OVER } (a,b)}^{(2)}$, THEN THERE EXISTS AT LEAST ONE POINT c IN (a,b) SUCH THAT $f'(c)=\dfrac{f(b)-f(a)}{b-a}$.

TO FIND c SUCH THAT THE MEAN VALUE THEOREM HOLDS,

(1) FIND $f(b)$ AND $f(a)$

(2) PLUG IN TO $\dfrac{f(b)-f(a)}{b-a}$ AND SIMPLIFY

(3) SET $f'(c)$ EQUAL TO YOUR SOLUTION IN (2) AND SOLVE FOR c.

LOCAL MAX AND MIN:

IF f HAS A LOCAL EXTREMUM AT c AND f IS DIFFERENTIABLE AT c, THEN $f'(c)=0$.

TO FIND LOCAL EXTREMA:

(1) EVALUATE f AT THE ENDPOINTS OF INTERVAL GIVEN

(2) FIND c SUCH THAT $f'(c)=0$

(3) ANALYZE RESULTS OF (1) AND (2) TO DETERMINE MIN/MAX

NOTE:

* IF $f'(c)=0$ AND $f''(c)>0 \Rightarrow f$ HAS A LOCAL MINIMUM AT c

* IF $f'(c)=0$ AND $f''(c)<0 \Rightarrow f$ HAS A LOCAL MAXIMUM AT c