2 Oct 2009

51) $f(x) = (x+1)^{2/3}$ $[0, 2]$ max $|f^4(x)|$

$f'(x) = \frac{2}{3}(x+1)^{-1/3}(1)$

$f''(x) = -\frac{2}{9}(x+1)^{-4/3}(1)$

$f'''(x) = \frac{8}{27}(x+1)^{-7/3}(1)$

$f^{iv}(x) = \frac{-56}{81}(x+1)^{-10/3}(1)$

$f^{v}(x) = \frac{560}{243}(x+1)^{-13/3}(1)$

$h(x) = |f^4(x)|$

$h(0) = \frac{56}{81}$ Max

$h(2) = \frac{56}{81(3^{10/3})}$

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(68) $f(x) = ax^3 + bx^2 + cx + d$ $a \neq 0$

$f'(x) = 3ax^2 + 2bx + c$

$4b^2 - 12ac$ $(b^2 - 3ac)$

> 0 2 critical pts

$= 0$ 1 critical pt

< 0 0 critical pts

(q)

$y = ax^2 + bx + c \qquad -500 \le x \le 100$

$y' = 2ax + b$

$y'(A) = 2aA + b = \frac{-9}{100}$

$y'(B) = 2aB + b = +\frac{6}{100}$

~~$(aA^2 + bA + c) - (aB^2 + bB + c)$~~

~~$B - A = 1000$~~

$A = -500$

$B = 500$

$-1000a + b = -\frac{9}{100}$

~~$1000a + b = \frac{6}{100}$~~

$2b = -\frac{3}{100}$

$b = -\frac{3}{200}$

etc

Rolle's Thm

If f is cont on $[a,b]$ and diff on (a,b)
and $f(a) = f(b)$

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

Case 1 $f(a) = f(b) = d$

Case 2 $f(x)$ is NOT CONSTANT

then graphs cannot be both max and min

$\therefore$ rel max or min

$\therefore$ critical pt

Mean Value Thm (for derivatives)

If f is cont on $[a,b]$ and diff on (a,b)

then there exists some $c \in (a,b)$

such that $f'(c) = \dfrac{f(b) - f(a)}{b-a}$

Rolle's Thm

MVT