



Happy Halloween!

Monday, October 31, 2016

5.2 - Mean Value Theorem

HW Questions

Ch 4 Test Review

Quiz 5.1-5.2 on Wednesday!

5.2 Mean Value Theorem

continuous on $[a, b]$

differentiable on (a, b)

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

Example 1

$$f(x) = 4x^3 - x^2 + 4 \quad [-1, 1]$$

$$f'(x) = 12x^2 - 2x$$

(A) Does MVT apply?

cont. on $[-1, 1]$ Yes

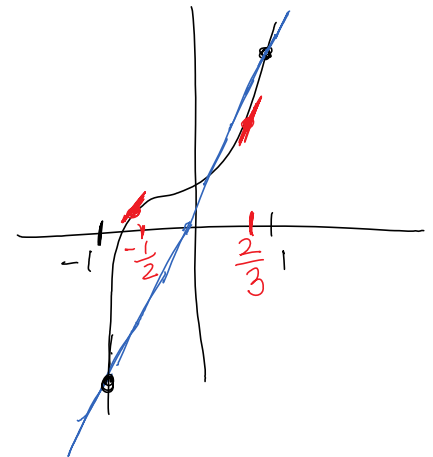
diff. on $[-1, 1]$ Yes

(B)

$$f'(c) = \frac{f(1) - f(-1)}{1 - (-1)}$$

$$12c^2 - 2c = \frac{7 - (-1)}{1 - (-1)}$$

$$12c^2 - 2c = \frac{8}{2} = 4$$



$$12c^2 - 2c - 4 = 0 \quad \text{solve for } c$$

$$2(6c^2 - c - 2) = 0$$

$$2(2c+1)(3c-2) = 0$$

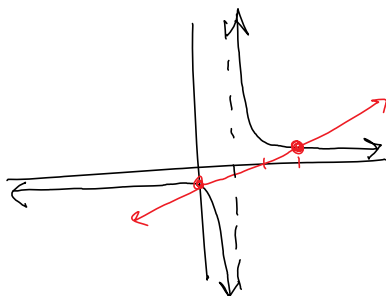
$$c = -\frac{1}{2}, \frac{2}{3}$$

Average slope = 4
 x-values where
 average slope occurs
 (in interval) = $[-\frac{1}{2}, \frac{2}{3}]$

$$(2) \quad f(x) = \frac{1}{x-1} \quad [0, 3]$$

(A) MVT applies?

cont. on $[0, 3]$ no-disc. @ $x=1$



makes no sense!

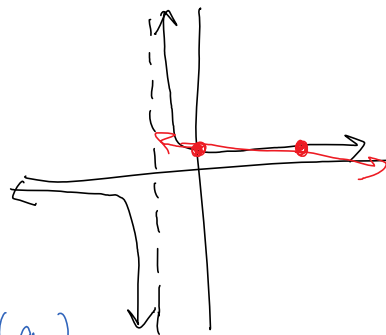
don't do problem

$$(3) \quad f(x) = \frac{1}{x+1} \quad [0, 3]$$

(A) MVT applies?

cont. on $[0, 3]$ yes

diff on $[0, 3]$ yes



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

$$\frac{-1}{(c+1)^2} = \frac{f(3) - f(0)}{3 - 0}$$

$$= \frac{\frac{1}{4} - 1}{3}$$

$$\frac{-1}{(c+1)^2} = -\frac{1}{4}$$

$$\begin{aligned} \sqrt{(c+1)^2} &= \sqrt{4} \\ c+1 &= 2 & c+1 &= -2 \\ c &= 1 & c &= -3 \end{aligned}$$

↖ not in interval