

MAC2311 Class Number 15534

QUIZ 9

3/21/2019

Name: SOLUTIONS

1. Find the critical numbers for the function

$$f(x) = \frac{1}{3}x^3 - \frac{3}{2}x^2 - 4x + 29$$

$$f'(x) = x^2 - 3x - 4 \quad \text{y} \downarrow \quad f'(x) \text{ IS DEFINED FOR ALL } x$$

$$f'(x) = 0 \Rightarrow x^2 - 3x - 4 = 0 \Rightarrow (x-4)(x+1) = 0$$

$$\Rightarrow \boxed{x=4, x=-1}$$

2. Find all numbers, c , that satisfy the conclusion of the mean value theorem for $f(x) = x^2 - x + 1$ on $[0, 4]$.

$$f(4) = 4^2 - 4 + 1 = 16 - 4 + 1 = 13$$

$$f(0) = 0^2 - 0 + 1 = 1$$

$$f'(x) = 2x - 1$$

$$f'(c) = 2c - 1$$

$$f'(c) = \frac{f(4) - f(0)}{4 - 0} = \frac{13 - 1}{4} = \frac{12}{4} = 3$$

$$2c - 1 = 3 \Rightarrow 2c = 4 \Rightarrow \boxed{c=2}$$

3. Find the absolute maximum and minimum of $f(x) = x^3 + 3x^2$ on $[0, 2]$.

(1) EVALUATE f AT ENDPOINTS: $f(0) = 0^3 + 3 \cdot 0^2 = 0$, $f(2) = 2^3 + 3(2^2) = 8 + 12 = 20$

(2) FIND $f'(x)$: $f'(x) = 3x^2 + 6x$

(3) FIND x SUCH THAT $f'(x) = 0$: $3x^2 + 6x = 0$
 $3x(x+2) = 0$

EITHER $3x = 0$ OR $x+2 = 0 \Rightarrow x=0, x=-2$
 \nearrow NOT IN DOMAIN OF f !
 $f(0) = 0$

\Rightarrow
 MAXIMUM: 20
 MINIMUM: 0