quiz 19
math1117.07
u new haven
f15nov

name: Solution

1. *(4 points each)* For the following functions, determine the location and value of the absolute extreme values on the given interval, if they exist.

(a) $f(x) = \dfrac{x}{(x^2+3)^2}$ on $[-2, 2]$

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

a) Find critical points

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

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

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

C.P. @ $x = \pm 1$

Test @ $x = \pm 1, \pm 2$

$f(-1) = \dfrac{-1}{(1+3)^2} = \dfrac{-1}{16}$ ← Min

$f(1) = \dfrac{1}{(1+3)^2} = \dfrac{1}{16}$ ← Max

$f(-2) = \dfrac{-2}{(4+3)^2} = \dfrac{-2}{49}$

$f(2) = \dfrac{2}{(4+3)^2} = \dfrac{2}{49}$

b) Find critical points

$$f'(x) = 4x^3 - 12x^2 + 8x$$

$$= 4x(x^2 - 3x + 2)$$

$$= 4x(x-1)(x-2)$$

C.P. @ $x = 0, 1, 2$

Test @ $x = -1, 0, 1, 2, 3$

$f(-1) = 1 + 4 + 4 = 9$ ← Max

$f(0) = 0$

$f(1) = 1 - 4 + 4 = 1$

$f(2) = 16 - 32 + 16 = 0$

$f(3) = 81 - 108 + 36 = -9$ ← Min