Quiz 4-D, Name: Key

Math 151-01 **07 November 2017**

Books, notes (in any form), calculators, etc., are not allowed. You must *show all your work* for full credit. Good Luck!

1. (15 pts) Given the following function and its derivatives

$$f(x) = \frac{-2x^2}{x^2+3} \qquad f'(x) = \frac{-12x}{(x^2+3)^2} \qquad f''(x) = \frac{36(x^2-1)}{(x^2+3)^3}$$

(a). Fill in the following information about the function and its graph. Show all work and write "none", if applicable.

domain: All real #'s

x-intercept(s): pt. (0,0)

y-intercept: pt. (0,0)

vertical asymptote(s): None

horizontal asymptote(s): $y = -2$

slant asymptote: None

critical numbers: $X = 0$

intervals where increasing: $(-\infty, 0)$

intervals where decreasing: $(0, \infty)$

coordinates of local max(s): $(0,0)$

coordinates of local min(s): None

intervals where concave up: $(-\infty,-1)\cup(1,\infty)$

intervals where concave down: $(-1,+1)$

Inflection Point(s): $(1,-\frac{1}{2})$ & $(-1,-\frac{1}{2})$

$x^2+3=0$ Never

X-int(y=0): $-2x^2=0 \Rightarrow x^2=0 \Rightarrow x=0$

y-int (x=0): $f(0) = \frac{0}{3} = 0$

V.A. $x^2+3=0$ Never.

H.A. $\lim_{x\to\infty} \frac{-2x^2}{x^2+3} = -2$ $\lim_{x\to-\infty} \frac{-2x^2}{x^2+3} = -2$

$y = -2$ is H.A.

f'(x)=0

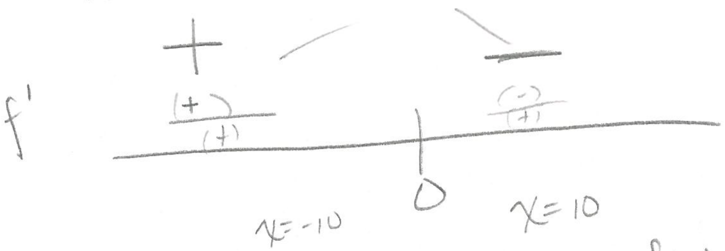
$-12x = 0$

$x = 0$

f'(x) DNE

$(x^2+3)^2 = 0$

$x^2+3=0$ Never.



Local max @ $x=0 \Rightarrow f(0)=0$

f''(x)=0

$36(x^2-1)=0$

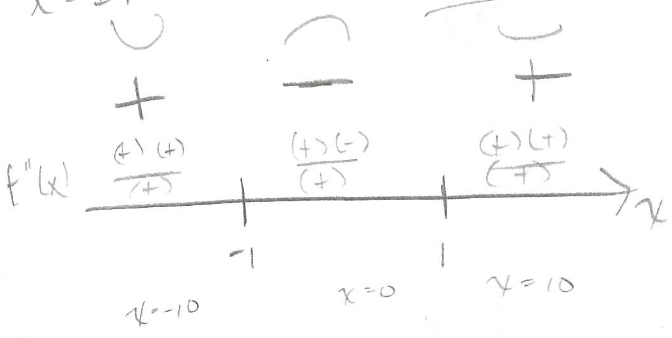
$x^2=1$

$x=\pm 1$

f''(x) DNE

$(x^2+3)^3 = 0$

$x^2+3=0$ Never

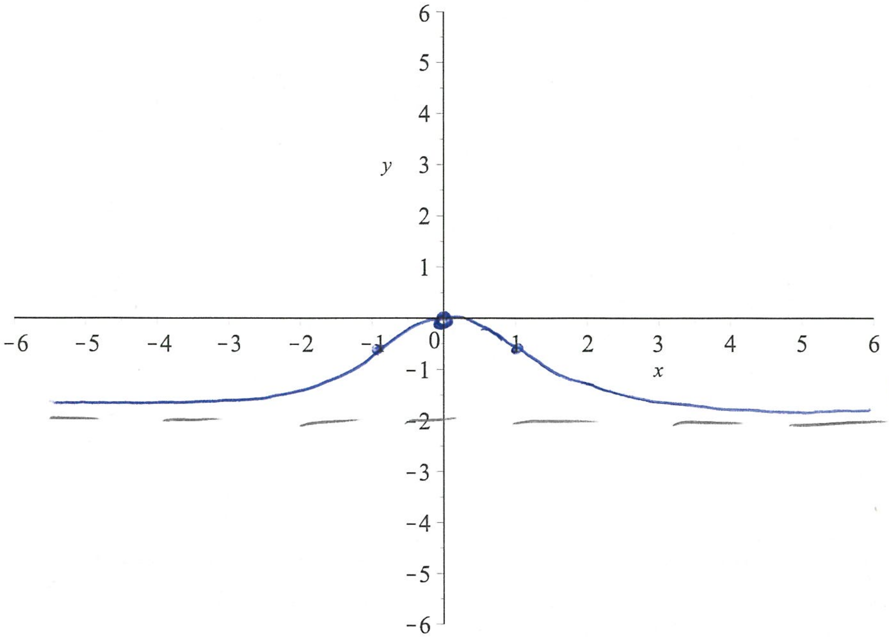


PoI @ x=-1 and -1

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

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

(b). Sketch the graph of the function on the set of axes provided. Label any maximum and minimum values and inflection points.



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

Just an extra set of axes, in case you need it.