Math 1411 Quiz 5 Name KEY

You may use a calculator and your homework, but not your books or notes. There is one problem worth 20 points. **Show all of your work to receive full/partial credit.** Use both sides of the page if necessary.

1) (#7 from 3.6) Analyze and sketch a graph of the function. Label any intercepts, relative extrema, points of inflection, and asymptotes.

$$y = \frac{x^2}{x^2+3}$$

x-int: $x^2 = 0$, $x = 0$ No vertical asymptotes

y-int: $y = 0$ horizontal asymptote: $\lim_{x\to\infty} \frac{x^2}{x^2+3} = 1$ so $y = 1$

$$\frac{dy}{dx} = \frac{2x(x^2+3) - x^2(2x)}{(x^2+3)^2} = \frac{2x^3+6x-2x^3}{(x^2+3)^2} = \frac{6x}{(x^2+3)^2}$$

Critical #'s: $6x = 0 \to x = 0$ is critical

	$(-\infty, 0)$	$(0, \infty)$
T.V.	$x = -1$	$x = 1$
f'	$-$	$+$
	$\downarrow$	$\uparrow$

decreasing on $(-\infty, 0)$

increasing on $(0, \infty)$

min. at $(0,0)$

$$\frac{d^2y}{dx^2} = \frac{6(x^2+3)^1 - 6x[2(x^2+3)(2x)]}{(x^2+3)^{4/3}} = \frac{6x^2+18-24x^2}{(x^2+3)^3} = \frac{-18x^2+18}{(x^2+3)^3}$$

I.P.'s: $-18x^2+18 = 0 \to 18x^2 = 18 \to x^2 = 1 \to x = 1, x = -1$ ← possible I.P.'s

	$(-\infty, -1)$	$(-1, 1)$	$(1, \infty)$
T.V.	$x = -2$	$x = 0$	$x = 2$
f''	$-$	$+$	$-$
	C.D.	C.U.	C.D.

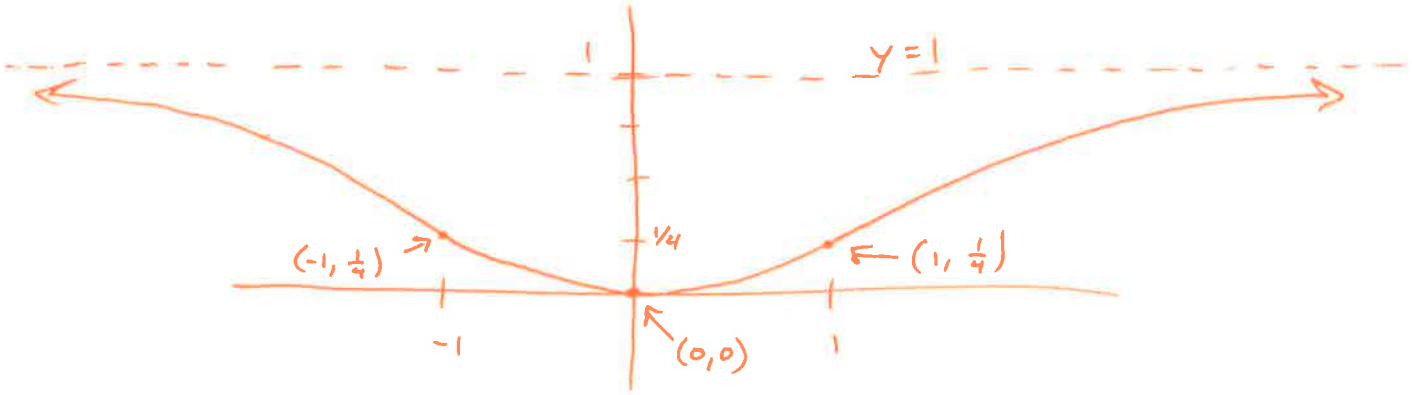
concave down on $(-\infty, -1) \cup (1, \infty)$

concave up on $(-1, 1)$

Inflection pts. at $(-1, f(-1))$, $(1, f(1))$

$\Rightarrow$ at $(-1, \frac{1}{4})$, $(1, \frac{1}{4})$

graph on back


1
y = 1
1/4
(-1, 1/4)
(1, 1/4)
-1
1
(0,0)