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

Find $f'(x)$:

$\frac{d}{dx}\left(\frac{2x^2}{x^2+3} + 1\right)$

$\frac{d}{dx}\left(\frac{2x^2}{x^2+3}\right) + \frac{d}{dx}(1)$

$\frac{d}{dx}\left(\frac{2x^2}{x^2+3}\right)$

$2\frac{d}{dx}\left(\frac{x^2}{x^2+3}\right)$

$2 \cdot \frac{\frac{d}{dx}(x^2)(x^2+3) - \frac{d}{dx}(x^2+3)x^2}{(x^2+3)^2}$

$\frac{12x}{(x^2+3)^2} = \frac{d}{dx}(f(x) = f'(x)$

Crit Points:

$\frac{12x}{(x^2+3)^2} = 0$ or DNE

Crit #=0=x

$12x = 0$ or $(x^2+3)^2 = 0$

$x = 0$ $\quad x^2+3=0$ complex #

$x^2 = -3$

$-$ ↓ ↑ $+$

$-1 \qquad 0 \qquad 1$

$(-\infty, 0)$ Decreasing

$(0, +\infty)$ Increasing

Cont.

Find $f''(x)$: cont.

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

$12 \cdot \frac{d}{dx}\left(\frac{x}{(x^2+3)^2}\right)$

$12 \cdot \frac{\frac{d}{dx}(x)(x^2+3)^2 - \frac{d}{dx}((x+3)^2)x}{((x^2+3)^2)^2}$

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

Inflection Points:

$f''(x) = 0$ or DNE

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

$36(x+1)(x-1) = 0$

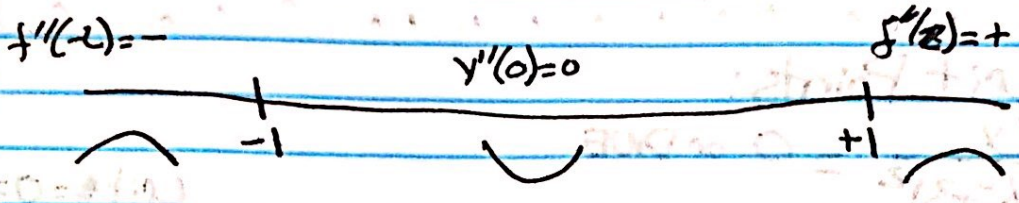
$x = \pm 1$

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

$x^2+3 = 0$

$x^2 = -3$

complex #



$(-\infty, -1) \cup (+1, +\infty)$: Inflection down $(\frown)$

$(-1, +1)$: Inflection up $(\smile)$

Local max/min:

crit points:

$x = 0$

Around 0 there is ↓ ↑ and $\cup$

$\therefore x = 0$ is a local min.

cont.

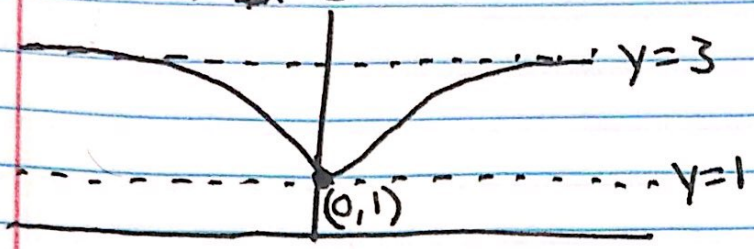
Vert asympt: Cont.

DNE

Horz asympt:

$$\lim_{x\to\infty} \frac{2x^2}{x^2+3} + 1 = 1$$

$$\lim_{x\to-\infty} \frac{2x^2}{x^2+3} + 1 = 3$$



07.11.2017

end