# §4.5 - Curve Sketching

1. Domain
2. x, y intercepts
3. Intervals of Increase or Decrease
4. Local mins + maxs
5. Concavity
6. Points of Inflection
7. End Behavior, $\lim_{x\to\infty} f(x)$, $\lim_{x\to-\infty} f(x)$

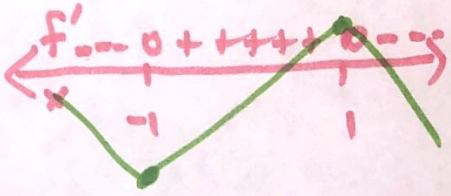
Ex: Sketch $y = \frac{x}{1+x^2}$ $\rightarrow$ $\frac{0}{1+0^2} = 0 \Rightarrow (0,0)$

$$y' = \frac{1+x^2 - 2x\cdot x}{(1+x^2)^2}$$

$$= \frac{1-x^2}{(1+x^2)^2} \rightarrow = 0 \Rightarrow x = 1, -1$$

DNE $\Rightarrow$ NEVER

$\frac{1}{1+1} = \frac{1}{2}$

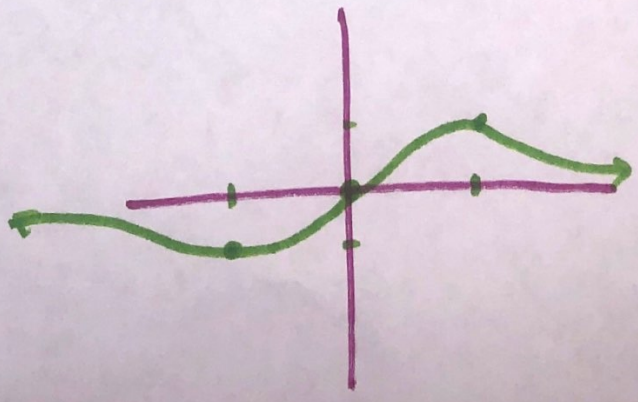



$\frac{-1}{1+1} = -\frac{1}{2}$

$f'(0) = +$

$f'(2) = -$

$f(-2) = -$



f(x) has 2 critical points, and

| | | |
|---|---|---|
| $f'>0$ | $f'<0$ | $f'<0$ |
| $f''>0$ | $f''>0$ | $f''<0$ |
| | $x=-2$ | $x=2$ |

at $x=2$ or $-2$, $f'=0$ or DNE