Survey reflection

- Math only tutoring in ACl-379A
  - M: 11AM-3PM
  - Tu: 8AM-7PM
  - W: none
  - Th: 8AM-7PM
  - F: 1PM-7PM

- Schedule posted online. Exam dates are not fixed!

- Quizzes
  - The purpose of in-class quizzes is to prepare you for exam. No reason doing them in groups.
  - More online quizzes

- Homework
  - If you want me to review a question from a homework in class, then ask at the begining of a class. (Have the question statement ready)
  - If you want to ask more in-depth question or have multiple questions, then come to my office :).

Quiz on 2.5, 3.1, 3.2 on Monday

Section 3.3 (Graphing functions)

"Use 3.1 and 3.2 to graph a function"

Ex: graph (sketch)

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

$(x+1)^2 = 0$

Domain: $(-\infty,-1) \cup (-1,\infty)$ $\qquad x=-1$

Inc/dec intervals, relative extrema:

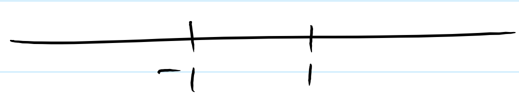
$$f'(x) = \frac{(x+1)^2 \cdot 1 - x \cdot 2(x+1) \overset{(x+1)'}{\cdot 1}}{[(x+1)^2]^2} = \frac{(x+1)^2 - 2x(x+1)}{(x+1)^4}$$

$$= \frac{\cancel{(x+1)}[(x+1)-2x]}{(x+1)^{\cancel{4}\,3}} = \frac{1-x}{(x+1)^3}$$

critical numbers: $1-x=0$ $\qquad x+1=0$

$x=1$ $\qquad \underbrace{x=-1}$

not a crit. num. b/c not in domain



f'	$(-\infty,-1)$ -2	$(-1,1)$ 0	$(1,\infty)$ 2
$(1-x)$	$+$	$+$	$-$
$(x+1)^3$	$-$	$+$	$+$

$\boxed{x=1 \to \text{rel. max}}$

( )	+	+	—
$(x+1)^3$	—	+	+
f''	—	+	—

$$\boxed{\begin{array}{l} x=1 \to \text{rel. max} \\ \text{no rel. min} \end{array}}$$

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

$$f''(x)=\frac{(x+1)^3\cdot(-1)-(1-x)\cdot 3(x+1)^2\cdot 1}{\left[(x+1)^3\right]^2}=\frac{-(x+1)^3-3(1-x)(x+1)^2}{(x+1)^6}$$

$$=\frac{\cancel{(x+1)^2}\left[-(x+1)-3(1-x)\right]}{(x+1)^{\cancel{6}4}}=\frac{-x-1-3+3x}{(x+1)^4}=\frac{2x-4}{(x+1)^4}$$

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

$x-2=0$

$x=2$

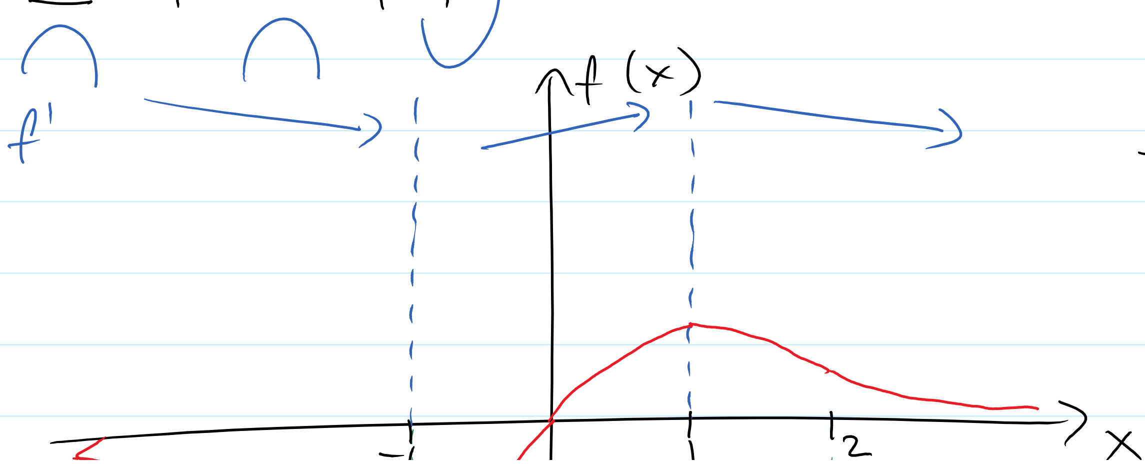
$x+1=0$

$x=-1$

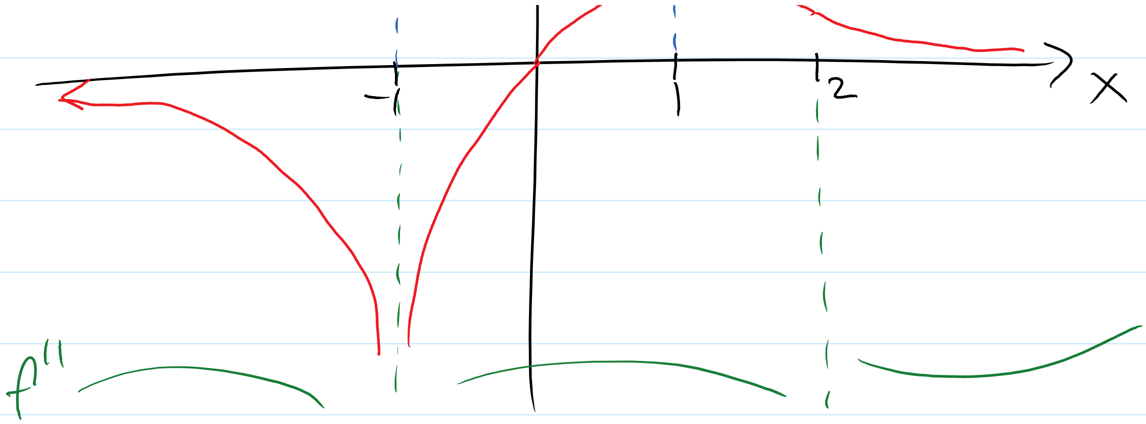
$-1 \quad 2$

f''	$(-\infty,-1)$	$(-1,2)$	$(2,\infty)$
	-2	0	3
$2(x-2)$	—	—	+
$(x+1)^4$	+	+	+
f''	—	—	+

$\boxed{x=2}$ is an inflection pt



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



Test symmetry: • $f(-x) = f(x) \rightarrow f$ is even
(sym. with respect to the y-axis)

• $f(-x) = -f(x) \rightarrow f$ is odd
(sym. with respect to the origin)

$$\lim_{x\to\infty} \frac{x}{\sqrt{x^2+1}} \cdot \frac{\frac{1}{\sqrt{x^2}}}{\frac{1}{\sqrt{x^2}}} = \lim_{x\to\infty} \frac{\frac{x}{\sqrt{x^2}}}{\sqrt{\frac{x^2}{x^2}+\frac{1}{x^2}}} = \lim_{x\to\infty} \frac{\frac{x}{|x|}}{\sqrt{1+\frac{1}{x^2}}}$$

$$= \lim_{x\to\infty} \frac{\frac{x}{x}}{\sqrt{1+\underbrace{\cancel{\frac{1}{x^2}}}_{0}}} = \frac{1}{\sqrt{1+0}} = \boxed{1}$$

$$\boxed{y=1}$$

$$\lim_{x\to-\infty} \frac{x}{\sqrt{x^2+1}} \cdot \frac{\frac{1}{\sqrt{x^2}}}{\frac{1}{\sqrt{x^2}}} = \lim_{x\to-\infty} \frac{\frac{x}{\sqrt{x^2}}}{\sqrt{\frac{x^2}{x^2}+\frac{1}{x^2}}} = \lim_{x\to-\infty} \frac{\frac{x}{|x|}}{\sqrt{1+\frac{1}{x^2}}}$$

Now since $x \to -\infty$, the $|x| = -x$.

$$= \lim_{x \to -\infty} \frac{\frac{x}{-x}}{\sqrt{1 + \frac{1}{x^2}}} = \lim_{x \to -\infty} \frac{-1}{\sqrt{1 + \frac{1}{x^2}}} = \frac{-1}{\sqrt{1+0}} = \boxed{-1}$$