

Panel 1

So far:

- ① Local extrema, incr./decr.
- ② Inflection points, concave up/down
- ③ Curve sketching (①+②+asympt.)
- ④ Abs. extrema on [a,b]

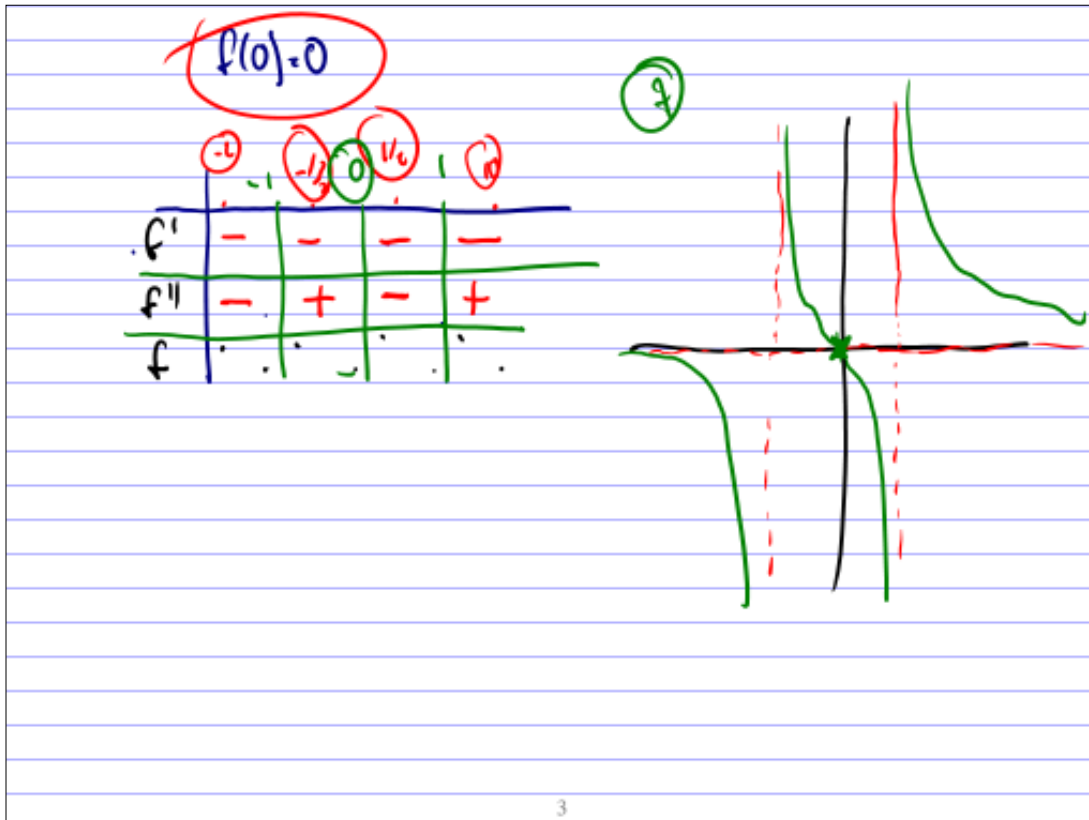
Panel 2

$f(x) = \frac{x}{x^2-1}$ sketch $f'(x) = \frac{-(x^2+1)}{(x^2-1)^2} = 0$ $\frac{x+1}{x^2-1}$
 $f''(x) = \frac{2x(x^2+3)}{(x^2-1)^3} = 0$

- ① Domain: $x \neq \pm 1$
- ② y-int: at $x=0$: $y=0$
- ③ Asympt.: $x = \pm 1$ vertical $\lim_{x \rightarrow c} f(x) = \pm \infty$
 $y = 0$ h.a. ($\lim_{x \rightarrow \pm \infty} f(x) = c$)
- ④ Critical: $x = \pm 1$
- ⑤ Poss. Inf. pts: $x = 0, \pm 1$
- ⑥ $f(0) = 0$

	-1	0	1	2
f'	-	-	-	-
f''	-	+	-	+
f	↘	↘	↘	↘

Panel 3



Panel 4

Name: _____

Quiz #8

$$f(x) = \frac{x^2 - 1}{x^2 - 4} \quad f'(x) = \frac{-6x}{(x^2 - 4)^2} \quad f''(x) = \frac{6(3x^2 + 4)}{(x^2 - 4)^3}$$

Make sure to mention the domain, intersects, asymptotes, extrema (if any), inflection points (if any), inc., dec., concave up, and concave down.

4

Panel 5



Panel 6

Optimization Problems

Typical problem: A farmer has 2400 feet of fencing. She wants to enclose a rectangular area bordering a river. She needs no fencing along the river. Find max. area!

1) Name variables
 2) Draw picture
 3) Min/max by finding $f' = 0$

Panel 7

Max. $A = xy \Rightarrow A' = 0$

Know: $2x + y = 2400, x \in [0, 1200]$

$y = 2400 - 2x$

$A = x(2400 - 2x) = 2400x - 2x^2$

$A' = 2400 - 4x = 0 \Rightarrow x = 600, y = 1200$

x	A
600	720,000 & max.
0	0
1200	0

A 600x1200 rectangle will give max area of 720,000 ft^2 .

Panel 8

Ex: A cylindrical can needs to hold 1l of oil. Find the dimensions that minimize the cost of the metal.

Want: minimize material
i.e. minimize surface area

$A = 2\pi r^2 + 2\pi r h$

Know: $V = \pi r^2 \cdot h = 1$

\Rightarrow (Diagram showing a cylinder being unrolled into a rectangle with height h and width $2\pi r$)