$$\int x^n\,dx = \frac{1}{n+1}x^{n+1} + C \qquad \text{when } n \neq -1$$

$$\int x^{-1}\,dx = \ln|x| + C$$

#2 $x = 0$ is a maximum

& #7

$$\int 10x^7 - 8x^3 + 3x^2 - x^1 + 5\,dx$$

$$= 10 \cdot \frac{1}{8}x^8 - 8 \cdot \frac{1}{4}x^4 + 3 \cdot \frac{1}{3}x^3 - \frac{1}{2}x^2 + 5x + C$$

$$\int \frac{5}{x^3} + \frac{2}{x^7} + \frac{1}{3x^7} + \frac{3}{x}\,dx$$

$$= \int 5x^{-3} + 2x^{-7} + \frac{1}{3}x^{-7} + 3x^{-1}\,dx$$

$$= 5 \cdot \frac{1}{-2}x^{-2} + 2 \cdot \frac{1}{-6}x^{-6} + \frac{1}{3} \cdot \frac{1}{-6}x^{-6} + 3\ln|x| + C$$

$$\int e^{kx} = \frac{1}{k}e^{kx} + C$$

$$\int e^{3x}\,dx = \frac{1}{3}e^{3x} + C \qquad \int a^{kx}\,dx = \frac{1}{k\ln a}a^{kx} + C$$

$$\int 4^{3x}\,dx = \frac{1}{3\ln 4}4^{3x} + C$$

$$\int (x+2)\cdot(x-3)\,dx$$

$$\cancel{\left(\frac{1}{2}x^2 + 2x\right)\left(\frac{1}{2}x^2 - 3x\right)}$$

$$\int x^2 - x - 6\,dx$$

$$\frac{1}{3}x^3 - \frac{1}{2}x^2 - 6x + C$$

$$\int (2x-1)^2\,dx$$

$$= \int (2x-1)(2x-1)\,dx$$

$$= \int 4x^2 - 4x + 1$$

$= 4 \cdot \frac{1}{3} x^3 - 4 \cdot \frac{1}{2} x^2 + x + C$

Sketch the curve for

vert ass tho

$f(x) = \frac{x+1}{x^2 - 9}$

tote

vert 'tote

$x^2 - 9 = 0$

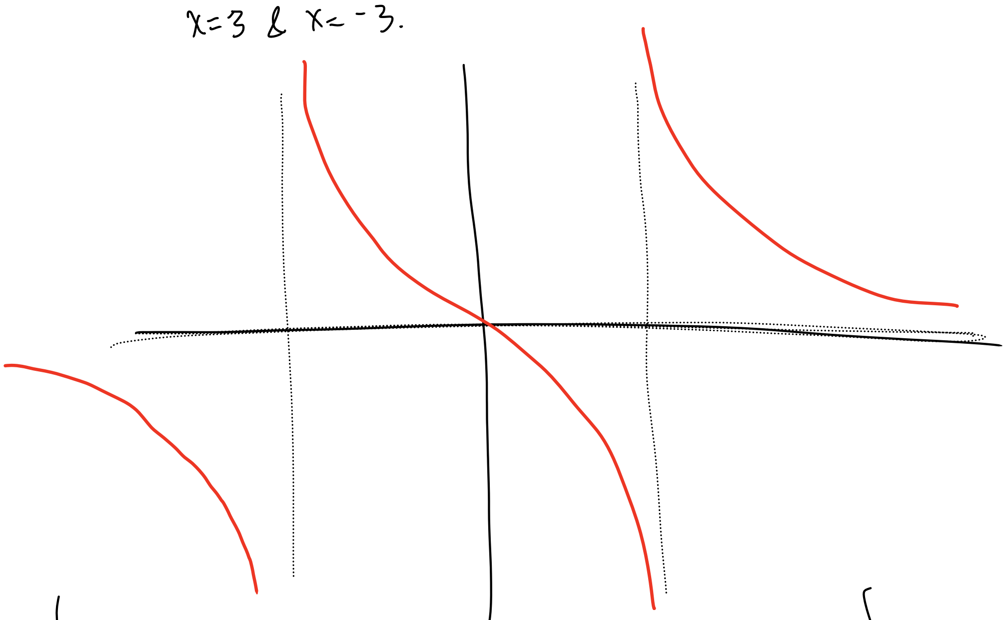
$x^2 = 9$

$x = \pm 3$

$x = 3$ & $x = -3$.

horz 'tote

$\lim_{x \to \infty} \frac{x+1}{x^2-9} = 0$



dec

dec

dec

$f(x) = \frac{x+1}{x^2-9}$

$$f'(x) = \frac{(x^2-9)\cdot 1 - (x+1)\cdot 2x}{(x^2-9)^2}$$

$$= \frac{x^2-9-2x^2-2x}{(x^2-9)^2}$$

$$= \frac{-x^2-2x-9}{(x^2-9)^2} = \boxed{-\frac{x^2+2x+9}{(x^2-9)^2}}$$

crit #s

f' = 0

$$-\frac{x^2+2x+9}{(x^2-9)^2} = 0$$

$$x^2+2x+9 = 0$$

no solns.

f' DNE

$$(x^2-9)^2 = 0$$

$$x^2-9 = 0$$

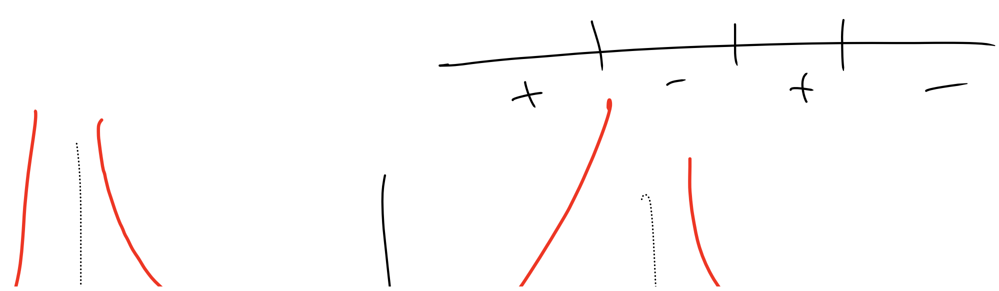
$$x^2 = 9$$

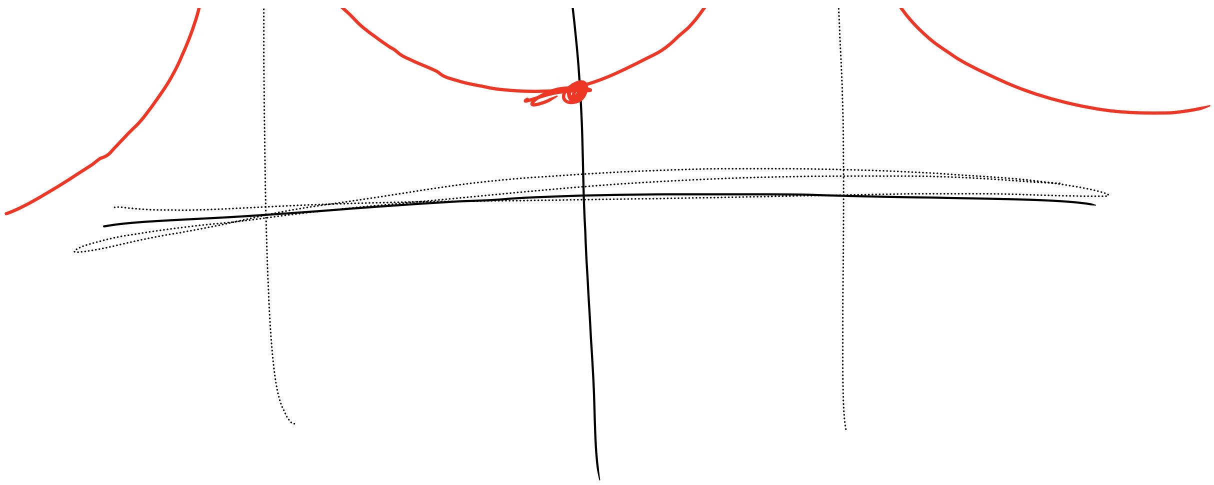
$$\boxed{x = \pm 3}$$

inc/dec

	-3		3	
f': —	DNE	—	DNE	—

f' is always negative





Find abs ext. of

$$f(x) = x^3 - 6x^2 \quad \text{on } [-1, 2]$$

$$f'(x) = 3x^2 - 12x$$

$f' = 0$

$$3x^2 - 12x = 0$$

$$3x(x-4) = 0$$

$3x = 0 \qquad x - 4 = 0$

$x = 0 \qquad x = 4$

outside the interval

x	y	
0	$0^3 - 6\cdot 0^2 = 0$	← max
$\cancel{4}$		
-1	$(-1)^3 - 6\cdot(-1)^2 = -1 - 6 = -7$	
2	$2^3 - 6\cdot 2^2 = 8 - 6\cdot 4 = -16$	← min

abs max is $f(0) = 0$

abs min is $f(2) = -16$

$x^3 - 6x^2$

find intervals where it's conc. up/down, find any inflection pts.

$f'(x) = 3x^2 - 12x$

$f''(x) = 6x - 12$

		2	
f''	$-$	0	$+$

$f'' = 0$: $6x - 12 = 0$

$6x = 12$

$x = 2$

$f''(0) = 6 \cdot 0 - 12 = -12$

$f''(3) = 6 \cdot 3 - 12 = 6$

Concave down on $(-\infty, 2)$

up on $(2, \infty)$

$x = 2$ is an inflection pt.

$f(x) = (7-x)\, e^{5x}$ find rel extrema.

$f'(x) = (7-x) \cdot e^{5x} \cdot 5 + e^{5x} \cdot (-1)$

$= e^{5x}\left((7-x) \cdot 5 + (-1) \right)$

$= e^{5x}(35 - 5x - 1)$

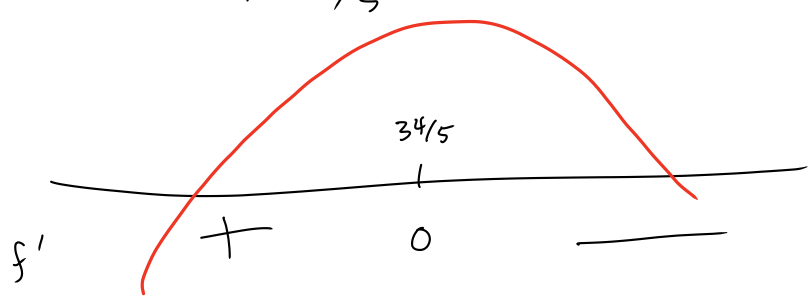
$$\boxed{f'(x) = e^{5x}(34-5x)}$$

$f'=0$: $\quad e^{5x}(34-5x)=0$

$\cancel{e^{5x}=0} \qquad 34-5x=0$

$$34 = 5x$$

$$x = 34/5$$



$$f'(0) = e^{5\cdot 0}(34-5\cdot 0) = +$$

$$+ \cdot +$$

$$f'(7) = e^{5\cdot 7}(34-5\cdot 7) = -$$

$$= + \cdot -$$

$x = 34/5$ is a rel max