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

a) Find domain, extrema, c.p. & infl. pts

Domain is $x \neq \pm 1$

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

$f'(x)$ DNE at $x=1$, but this isn't in domain of $f(x)$

$f'(x) = 0$ doesn't happen

No c.p., no extrema

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

$f''(x)$ DNE at $x=1$, but this isn't in domain of $f(x)$

$f''(x) = 0$ doesn't happen

No infl. pts

b) Find VA, HA & SA

No SA

$\lim_{x \to 1^+} f(x) = \infty$, $\lim_{x \to 1^-} f(x) = -\infty$, $\lim_{x \to -1} f(x) = 0$

VA $x = 1$

$\lim_{x \to \infty} f(x) = 1$, $\lim_{x \to -\infty} f(x) = 1 \Rightarrow$ HA $y = 1$

c) Find incr., decr., concave ↑ & concave ↓ intervals

$f'(x) < 0$ on domain $\Rightarrow$ **Decr. on $(-\infty,-1)\cup(-1,1)\cup(1,\infty)$**

x		-1		1	
f''	$-$	DNE	$-$	DNE	$+$

Concave ↑ on $(1,\infty)$
Concave ↓ on $(-\infty,-1)\cup(-1,1)$

d) Graph