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

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

$\boxed{\text{Domain is all real numbers}}$ since $x^2+1 \neq 0$

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

$f'(x)$ exists everywhere

$f'(x) = 0$ at $x = 1, -1$

$f(1) = \frac{4}{2} = 2, \quad f(-1) = 0$

$\boxed{\text{c.p. } (1,2) \ \& \ (-1,0)}$

f'	$-$	0	$+$	0	$-$
x		-1		1	

$\lim\limits_{x\to\infty} f(x) = 1, \quad \lim\limits_{x\to-\infty} f(x) = 1$

$\boxed{\begin{array}{l}\text{Abs. min. at } (-1,0)\\ \text{Abs. max at } (1,2)\end{array}}$

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

$f''(x)$ exists everywhere

$f''(x) = 0$ at $x = 0, \sqrt{3}, -\sqrt{3}$

f''	$-$	0	$+$	0	$-$	0	$+$
x		$-\sqrt{3}$		0		$\sqrt{3}$	

$f(-\sqrt{3}) = 1 - \frac{\sqrt{3}}{2}$

$f(0) = 1$

$f(\sqrt{3}) = 1 + \frac{\sqrt{3}}{2}$

$\boxed{\begin{array}{ll}\text{Infl. pts. at} & (-\sqrt{3}, 1-\sqrt{3}/2)\\ & (0,1)\\ & (\sqrt{3}, 1+\sqrt{3}/2)\end{array}}$

b) Find VA, HA & SA

$\boxed{\text{No VA or SA}}$

$\lim_{x \to \infty} f(x) = 1$, $\lim_{x \to -\infty} f(x) = 1$ so $\boxed{\text{HA at } y=1}$

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

f'	−	0	+	0	−
x		−1		1	

$\boxed{\begin{array}{l}\text{Incr. on } (-1,1) \\ \text{Decr. on } (-\infty,-1) \cup (1,\infty)\end{array}}$

f''	−	0	+	0	−	0	+
x		$-\sqrt{3}$		0		$\sqrt{3}$	

$\boxed{\begin{array}{l}\text{C.}\uparrow \text{ on } (-\sqrt{3},0) \cup (\sqrt{3},\infty) \\ \text{C.}\downarrow \text{ on } (-\infty,-\sqrt{3}) \cup (0,\sqrt{3})\end{array}}$

d) Graph