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$$\lim_{x\to 2^-} \frac{3x+6}{\frac{1}{x^2}-\frac{1}{4}}$$

$$\frac{3(x+2)}{\frac{4}{4x^2}-\frac{x^2}{4x^2}} = \frac{3(x+2)}{\frac{4-x^2}{4x^2}} = \frac{3(x+2)4x^2}{4-x^2} = \frac{12x^2\cancel{(x+2)}}{(2-x)\cancel{(2+x)}}$$

As $x \to 2^-$, $12x^2 \to 48$, but $2-x \to 0^+$

so $\frac{3x+6}{\frac{1}{x^2}-\frac{1}{4}} \to +\infty$ as $x \to 2^-$.

$h(r) = e^{e^{e^r}}$. Find $h'(r)$.

$$h'(r) = e^{\bigcirc}\cdot \bigcirc'$$

$$= e^{e^{e^r}}\cdot\left(e^{\boxed{e^r}}\right)'$$

$h^{(100)}(r)$

$$= e^{e^{e^r}}\cdot\left(e^{\square}\cdot\square'\right)$$

$$= \underbrace{e^{e^{e^r}}}_{A}\cdot\underbrace{e^{e^r}}_{B}\cdot\underbrace{e^r}_{C}.$$

$$h''(r) = A'\cdot(B\cdot C) + A\cdot(B\cdot C)' = \underline{A'BC + A(B'C + BC')}$$

$$\lim_{x \to 0} \left|\operatorname{Arctan}\left(\frac{1}{x}\right)\right|$$

As $x \to 0^+$, $\frac{1}{x} \to +\infty$ & $\left|\operatorname{Arctan}\left(\frac{1}{x}\right)\right| \to \frac{\pi}{2}$

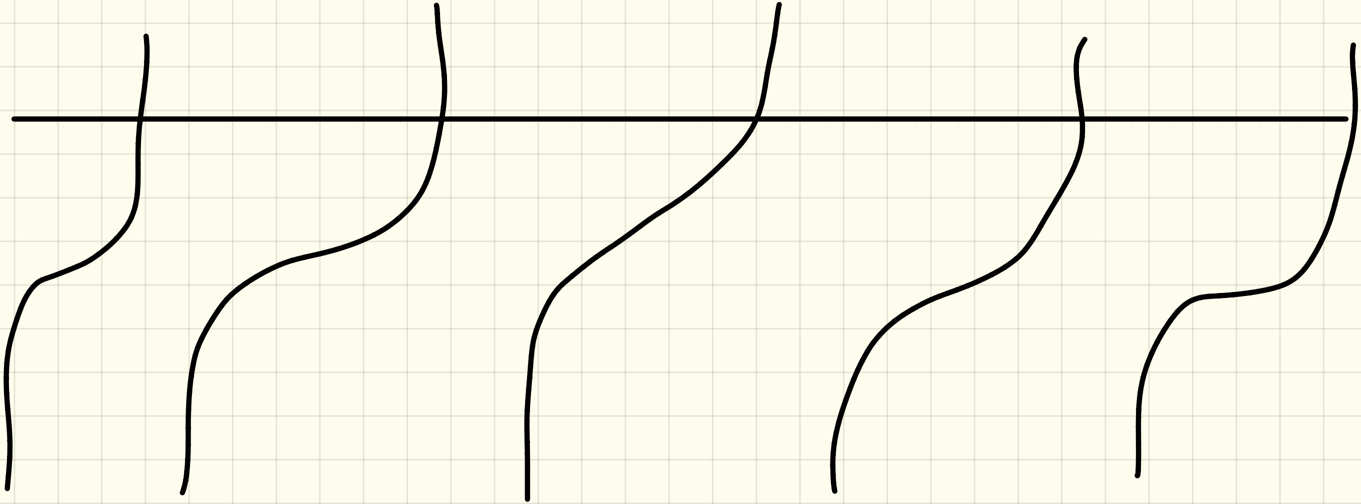
$x \to 0^-$, $\frac{1}{x} \to -\infty$ & $\left|\operatorname{Arctan}\left(\frac{1}{x}\right)\right| \to \frac{\pi}{2}$

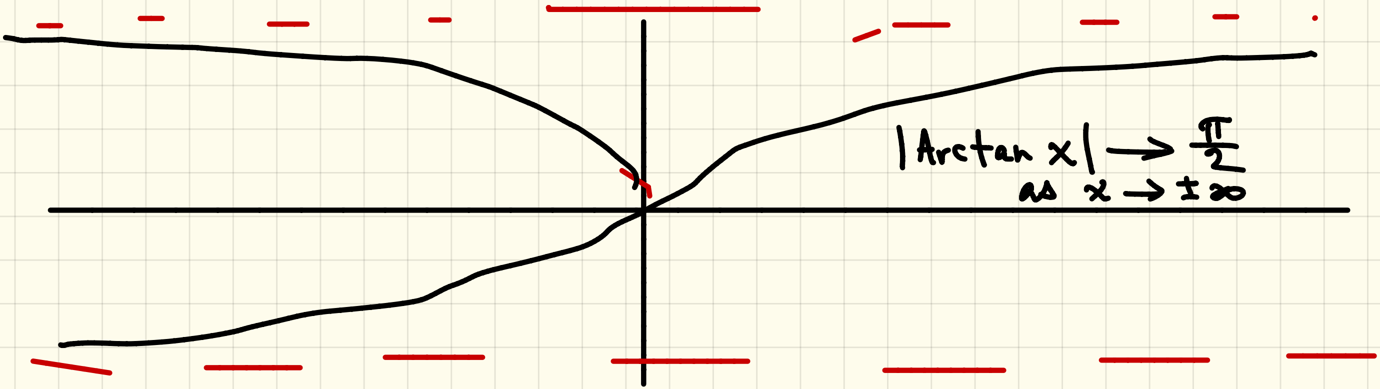
$$\boxed{\frac{\pi}{2}}$$

$$\lim_{x \to -\infty} \frac{1+x^6}{x^4+1} \cdot \frac{\frac{1}{x^4}}{\frac{1}{x^4}} = \lim_{x \to -\infty} \frac{\frac{1}{x^4}+x^2}{1+\frac{1}{x^4}}$$

as $x \to -\infty$,

$\frac{1}{x^4} \to 0$, $x^2 \to +\infty$, so $\frac{1+x^6}{x^4+1} \to +\infty$





$|\text{Arctan}\, x| \to \frac{\pi}{2}$ as $x \to \pm\infty$