

$$\begin{aligned}
\lim_{x \rightarrow +\infty} (x^3 + 1)^{\frac{1}{\ln x}} &= \lim_{x \rightarrow +\infty} e^{\ln(x^3 + 1) \frac{1}{\ln x}} = \lim_{x \rightarrow +\infty} e^{\frac{\ln(x^3 + 1)}{\ln x}} = \lim_{x \rightarrow +\infty} e^{\frac{3 \ln x + \ln(1 + \frac{1}{x^3})}{\ln x}} = \\
&\lim_{x \rightarrow +\infty} e^{3 + \frac{\ln(1 + \frac{1}{x^3})}{\ln x}} = \lim_{x \rightarrow +\infty} e^{3 + \frac{0}{+\infty}} = e^3
\end{aligned}$$