L'Hôpital's Rule and algebra

$$\frac{a^{\to 0}}{b_{\to 0}} = \frac{\frac{1}{b}\Big\}^{\to \infty}}{\frac{1}{a}\Big\}_{\to \infty}} = \overset{\to 0}{a}\,\overset{\to \infty}{\left(\frac{1}{b}\right)}$$

"$\frac{0}{0}$" "$\frac{\infty}{\infty}$" "$0 \cdot \infty$"

indeterminate limits all simply related by rules of fractions

$\downarrow$ exp $\uparrow$ ln

$$e^{a\left(\frac{1}{b}\right)} = \Big(\underbrace{e^{\overset{\to 0}{a}}}_{1}\Big)^{\overset{\to \infty}{\frac{1}{b}}} = \Big(e^{\overset{\to \pm\infty}{\frac{1}{b}}}\Big)^{\overset{\to 0}{a}}$$

"1^{∞}"

$+$: $(e^{+\infty})^{0} =$ "∞^{0}"

$-$: $(e^{-\infty})^{0} =$ "0^{0}"

taking the ln of these expressions takes us back to quotients where L'Hopital's rule can be used

but then we have to exponentiate the result to evaluate our original limit