COMPARISON OF RATES OF GROWTH $\to +\infty$

$$\ln(\ln n) \ll \ln n \ll n^p \ll a^n \ll n! \ll n^n$$

$\ln n$ or $\log_b n$ $(b>1)$

$(p>0)$

$(a>1)$

logarithmic

power

exponential

factorial

$n! = n(n-1)(n-2)\cdots 2\cdot 1$

$$\frac{\ln(\ln n)}{\ln n} \to 0$$

$$\frac{\ln n}{n^p} \to 0$$

$$\frac{n^p}{a^n} \to 0$$

$$\frac{a^n}{n!} \to 0$$