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0.0.1 Asymptotic Notation

Fact: $f(n) \in o(g(n)) \iff \lim_{n\to\infty} f(n)/g(n) = 0$

$\omega \iff = \infty$

$\Theta \iff = C \neq \infty, 0$

Use L'Hopital's Rule.

Useful: $a^{\log_b n} = n^{\log_b a}$

$\sum i = \Theta(n^2)$ (arithmetic series)

$\sum c^i = \Theta(c^n)$ (geometric series)

$\sum 1/i = \Theta(\log n)$ (harmonic series)

$\log(n!) = n \log n - \Theta(n)$ (harmonic series) (Stirling formula)

$\Theta(\sum \log(n/i)) = \Theta(\sum(\log n - \log i)) = \Theta(n \log n - (n \log n - \Theta(n))) = \Theta(n)$

$T(n) = 2T(n/2) + n^2 = \Theta(N^2)$