

May 12, 2016

**0.0.1 Asymptotic Notation**Fact:  $f(n) \in o(g(n)) \iff \lim_{n \rightarrow \infty} f(n)/g(n) = 0$  $\omega \iff = \infty$  $\Theta \iff = C \neq \infty, 0$ 

Use L'Hopital's Rule.

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

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 $\sum i = \Theta(n^2)$  (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) $\Theta(\sum \log(n/i)) = \Theta(\sum (\log n - \log i)) = \Theta(n \log n - (n \log n - \Theta(n))) = \Theta(n)$  $T(n) = 2T(n/2) + n^2 = \Theta(N^2)$