Big O Notation

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Big O Notation

Family of Bachmann-Landau notations

Name	Notation
Big O(micron)	$\mathcal{O}$ or O
Big Omega	Ω
Big Theta	Θ
Small O(micron)	o
Small Omega	ω
On the order of	$\sim$

Formal Definitions

$T(N) = O(f(N))$ if there are positive constants c and n_0 such that $T(N) \leq cf(N)$ when $N \geq n_0$

$T(N) = \Omega(g(N))$ if there are positive constants c and n_0 such that $T(N) \geq cg(N)$ when $N \geq n_0$

$T(N) = \Theta(h(N))$ if and only if $T(N) = O(h(N))$ and $T(N) = \Omega(h(N))$

$T(N) = o(p(N))$ if $T(N) = O(p(N))$ and $T(N) \neq \Theta(p(N))$

Example

If $f(n) = 4n^2 + 16b + 2$, is $f(n) = O(n^n)$? Yes. There should exist positive constants c and n_0 such that $f(n) \leq cf(n)$ when $n \geq n_0$ (ex: consider $c = 5$ and $n_0 = 2$).