13.8 Big-O

Not to be confused with Big-Theta.

Asymptotics3, Video 1 Big O

O (pronounced "Big-Oh") is similar to Θ. Instead of being an "equality" on the order of growth, it can be though of as "less than or equal."
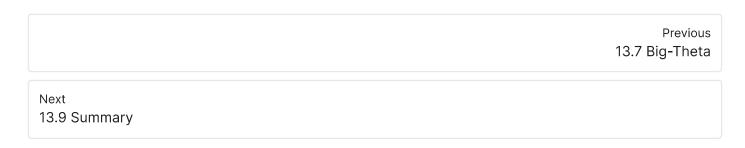
For example, the following statements are all true:

- $N^3 + 3N^4 \in \Theta(N^4)$
- $N^3 + 3N^4 \in O(N^4)$
- $N^3 + 3N^4 \in O(N^6)$
- $N^3 + 3N^4 \in O(N^{N!})$

Formal Definition

$R(N) \in \mathrm{O}(f(N))$ means that there exists positive constant k_2 such that:
$R(N) \leq k_2 \cdot f(N)$ for all values of N greater than some N_0 (a very large N).

Observe that this is a looser condition than Θ since O does not care about the lower bound.

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