Big O Notation (Upper Bound on Order of Growth)

We say $f(n) = O(g(n))$ if there exist constants c and n_0 such that $f(n) \leq cg(n)$ for all $n \geq n_0$

Example: $f(n) = 2n + 3$ can written as $O(n)$.

$f(n) \leq cg(n)$ for all $n \geq n_0$

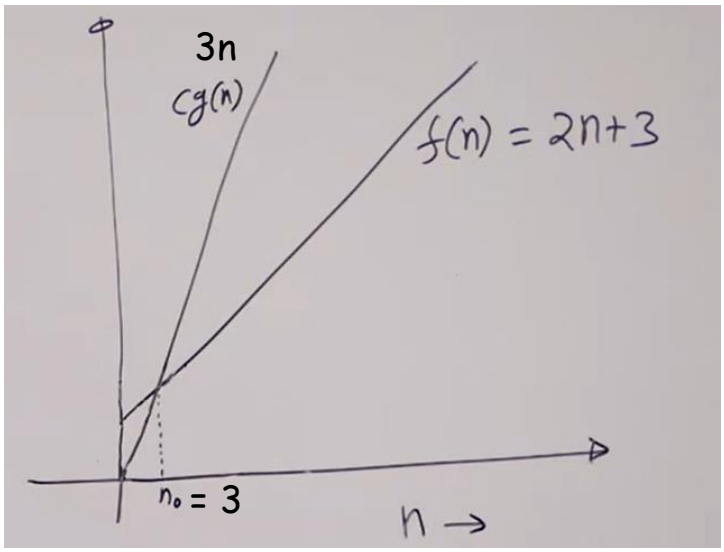
$(2n + 3) \leq cn$ for all $n \geq n_0$

Placed, $c = 3$

⇨ $(2n + 3) \leq 3n$

⇨ $3 \leq n$

⇨ $n_0 = 3$



$f(n) = 3n^2 + 2n + 100$

$= O(n^2)$

Another example:

$f(n) = 4n + \log n + 30$

$= O(n)$

$\{n/4, 2n + 3, n/100 + \log n, n + 10000, n/10000, 100, \ldots\} \in O(n)$

$\{n^2+n, 2n^2, n^2+1000n, n^2+2\log n, n^2/1000, \ldots\} \in O(n^2)$

$\{1000, 2, 1, 3, 10000, 100000, 1000000, \ldots\} \in O(1)$