Asymptotic Notation →

TC → $\underbrace{2n^2 + 3n + 5}$ → Complex for analyzing

Approximate − ① Dominant term $= n^2$

② $c \times n^2$

$1 < \log n < \sqrt{n} < n < n \log n < n^2 < n^3 < 2^n < 3^n < n^n$

Increasing TC → Increasing Dominance for large value of n.

$n < n \log n$

$n=1,\quad 1 < 1 \log 1$

$1 < 0$

3 notation -

① Big OH ② Big Omega ③ Theta.

Big OH —

Given two functions **f(n)** and **g(n)**, we say that **f(n)** is **O(g(n))** if there exist constants **c > 0** and **n_0** >= 0 such that **f(n) <= c*g(n)** for all **n >= n_0**.

$f(n) \rightarrow \underline{\underline{TC}}$ (Complex f^n) → Approximate.

$f(n) = O(g(n))$

$\Rightarrow f(n) <= c \cdot g(n)$, $c = \text{const} > 0$, $g(n)$, $n_0 > 0$

$f(n) = 2n + 3$, Find its upper bound.

1. $f(n) = O(g(n))$ —

$\Rightarrow f(n) <= c \times g(n)$

$2n+3 <= c \times g(n) \longrightarrow g(n) = n.$

$2n+3 <= c \times n$

Trial && Error method.

Def^n — $n >= n_0$ n_0 positive.

$c = 1, \quad 2n+3 <= n$

$\Rightarrow n <= -3.$ ← contradict.

$c=2, \quad 2n+3 <= 2n$

$\Rightarrow 3 <= 0$ ✗

$c=3, \quad 2n+3 <= 3n$

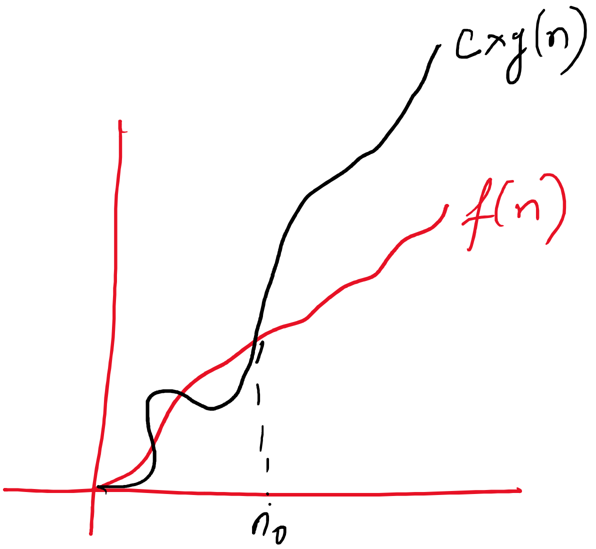
$\Rightarrow 3 <= n$

$\Rightarrow n >= 3$

Ans. $g(n) = n$

$c = 3$

$n_0 = 3$



$c=5, \quad 2n+3 <= 5n$

$\Rightarrow 3 <= 3n$

$\Rightarrow 1 <= n$

$\Rightarrow n >= 1$

Ans $g(n) = n$

$c = 5$

$n_0 = 1$

$n >= n_0$

2. Ω Big Omega — $c \times g(n) <= f(n)$

3. Θ = Avg. $c_1 g(n) <= f(n) <= c_2 g(n)$