→ Order of Growth

A function $f(n)$ is said to be growing faster than $g(n)$ if

$$\lim_{n \to \infty} \frac{g(n)}{f(n)} = 0$$

$f(n)$ and $g(n)$ represent Time taken.

$n \geq 0$

$f(n), g(n) \geq 0$

Eg

$$\lim_{n \to \infty} \frac{2n+5}{n^2+n+6}$$

$$= \lim_{n \to \infty} \frac{2/n + 5/n^2}{1 + 1/n + 6/n^2}$$

$$= \lim_{n \to \infty} \frac{0+0}{1+0+0} \Rightarrow 0$$

Hence, $f(n)$ is growing faster than $g(n)$.

→ Direct way to find and compare Growths

↳ ① Ignore lower order terms
② Ignore leading term constants

Example : $f(n) = 2n^2 + n + 6$, order of growth : n^2 (quadratic)
$g(n) = 100n + 3$, order of growth : n (linear)

How do we compare terms?