* Taller - Regla del límite

Dado

- $F(n) = n^3 + 9n^2 \log(n)$
- $g(n) = n^2 \log(n)$

Comprobar si $F(n) \in (g(n))$, No

$$F(n) = n^3 + 9n^2 \log(n)$$

$$g(n) = n^2 \log(n)$$

$$\frac{f(n)}{g(n)} = \frac{n^3 + 9n^2 \log(n)}{n^2 \log(n)} = \frac{n^3}{n^2 \log(n)} + \frac{9n^2 \log(n)}{n^2 \log(n)}$$

$$= \frac{n}{\log(n)} + 9$$

Cuando $n \to \infty$, $\frac{n}{\log(n)} \to \infty$, entonces

$$\frac{f(n)}{g(n)} \to \infty \Rightarrow F(n) \notin O(g(n))$$

Esto implica que $F(n) \notin O(g(n))$

Comprobar si $f(n) \notin O(n^2)$, si

$$\frac{f(n)}{n^2} = \frac{n^3 + 9n^2 \log(n)}{n^2} = n + 9\log(n) \to \infty$$

Esto implica que $F(n) \notin O(n^2)$

Notas

$F(n) = 2^n$
$g(n) = 2^{2n} = (2^n)^2$

* comprobar si $F(n) \in O(g(n))$

$$\frac{F(n)}{g(n)} = \frac{2^n}{2^{2n}} = \frac{1}{2^n} \to \lim_{n \to \infty} \frac{F(n)}{g(n)} = 0$$

* Si $g(n) \in O(f(n))$, NO

$$\frac{g(n)}{F(n)} = \frac{2^{2n}}{2^n} = 2^n \to \infty \Rightarrow g(n) \in O(f(n))$$

$g(n) \in O(f(n))$