

$$n \log n, n^2$$

$$f(n) = n \log n \rightarrow \text{dominado}$$

$$g(n) = n^2 \rightarrow \text{dominante}$$

Forma 1: Usando límites

$$\lim_{n \rightarrow \infty} \frac{n \log n}{n^2} = \lim_{n \rightarrow \infty} \frac{\log n}{n} = 0$$

$$\therefore g(n) \text{ Domina} \rightarrow \text{i.e. } f(n) \leq g(n) \rightarrow \text{Big O}$$

Forma 2: Usando notación asintótica

$\Rightarrow \text{Big O}$

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

$$= \{c > 0 : n \log n \leq cn^2\}$$

$$n \log n \leq cn^2$$

$$\frac{n}{n^2} \log n \leq c \frac{n^2}{n^2}$$

$$\frac{\log n}{n} \leq c$$

$$\therefore n \log n = O(n^2)$$

$\Rightarrow \text{Big Omega}$

$$\lim_{n \rightarrow \infty} \frac{n \log n}{n^2} = 0 \neq \infty \quad \therefore \text{No es big omega}$$

$$\Omega(g(n)) = \{f(n) : \exists c, n_0 > 0 \text{ tal que } 0 \leq cg(n) \leq f(n) \forall n \leq n_0\}$$

$$0 \leq cn^2 \leq n \log n \quad \forall n \geq n_0$$

$$cn^2 = n \log n$$

$$cn = \log n$$

$$c = \frac{\log n}{n}$$

$$cn^2 < n \log n$$

$$c < \frac{\log n}{n}$$

$C = \text{Sin Respuesta}$

$$C = 0$$

$$C = 0.5$$

$C = \text{Sin Respuesta}$

$$C = 0$$

$$C = 0.5$$

$$n_0 = 0$$

$$n_0 = 1$$

$$n_0 = 2$$

$$\therefore n \log n \neq \Omega n^2$$

\Rightarrow Big Theta

$$n \log n = \Theta n^2$$

$$\underbrace{n \log n = O(n^2)}_{\text{VERDADERO}} \quad \& \quad \underbrace{n \log n = \Omega n^2}_{\text{FALSO}}$$

FALSO

$$\therefore n \log n \neq \Theta n^2$$