

Ejercicio 5

Probar que the running time of an algorithm is $O(g(n))$ if and only if its worst-case running time is $O(g(n))$ and its best case running time is $\Omega(g(n))$

Para $O(g(n))$

Mejor caso $\Omega(g(n))$

Peor caso $O(g(n))$

Sea $T(n) = O(g(n))$ para $n \geq n_0$

$$0 \leq c_1 g(n) \leq T(n) \leq c_2 g(n)$$

Como:

$$0 \leq T(n) \leq c_2 g(n) \text{ para } n \geq n_0$$

$$T(n) = O(g(n)) \text{ (límite superior)}$$

Como

$$0 \leq c_1 g(n) \leq T(n) \text{ para } n \geq n_0$$

$$T(n) = \Omega(g(n)) \text{ (límite inferior)}$$

Finalmente:

$$\Omega(g(n)) \leq T(n) \leq O(g(n))$$