EDF no homogénea

$a(n) = a_c(n) + a_p(n) \longrightarrow$ proponemos

$\downarrow$

ec. carac.

$a(n) = 2a(n-1) + 2n$

polinomio grado 1

① EDFH: $a(n) = 2a(n-1)$

$r - 2 = 0 \longrightarrow r = 2$

$\longrightarrow a_c(n) = c_1 \cdot 2^n = c_1 \cdot 2^n$

$An+B$

② Propuesta de $a_p(n)$: $a_p(n) = (An+B) \cdot n = An^2 + Bn$

EDF: $a(n) = 2a(n-1) + 2n$

$An^2 + Bn = 2\left(A(n-1)^2 + B(n-1)\right) + 2n$

$An^2 + Bn = 2An^2 - 4An + 2A + 2Bn - 2B + 2n$

$-An^2 + 4\cancel{A}^{0}n - Bn + 2B - 2\cancel{A}^{0} = 2n$

$A=0$ porque no hay n^2

$-Bn + 2B = 2n$

$B=-2$

$B=0$

$a(n) = a(n-1) + 2^n$

EDFH: $a(n) = a(n-1)$

$r = 1 \longrightarrow a_c(n) = c_1 \cdot 1^n = c_1$

$\longrightarrow a_c(n) = c_1$

$\longrightarrow a_p(n) = A \cdot 2^n \cdot n$

$kn \longrightarrow a_p(n) = An + B$

$kn^2 \longrightarrow a_p(n) = An^2 + Bn + C$

$2^n \longrightarrow a_p(n) = A \cdot 2^n$

$3^n \longrightarrow a_p(n) = A \cdot 3^n$

<u>Prop. arquimediana</u>

Si $a < b$ y $c < d$ $\longrightarrow a + c < b + d$

$\longrightarrow a \cdot c < b \cdot d$

$f(n) = n^2 \log n + n$

$\underline{\theta(n^2 \log n)}$: $f(n) \leq c \cdot n^2 \log n$

$2n^2 \log n \longrightarrow c = 2$

$n^2 \log n + n \leq n^2 \log n + n^2 \leq n^2 \log n + n^2 \log n \leq c \cdot n^2 \log n$

$\Omega(n)$ $\quad \theta(n^2)$

$\Omega(n^2 \log n)$ $\quad c \cdot n^2 \log n \leq f(n)$

$1 \cdot n^2 \log n \leq n^2 \log n + n$

$c = 1$

$f(n) = \log n!$

$\underline{\theta(n \log n)}$: $f(n) \leq c \cdot n \log n$

$\log n! = \log(1 \cdot 2 \cdot 3 \cdot \ldots \cdot n) = \log 1 + \log 2 + \log 3 + \ldots + \log n$

$$\log 1 + \log 2 + \log 3 + \dots + \log n \leq \log n + \log n + \log n + \dots + \log n$$

$$\leq n \cdot \log n$$

$\underline{\Omega(1):}$ $\quad c \leq f(n)$

$$\log n!$$

$$\log 1 + \log 1 + \dots + \log 1 \leq \log 1 + \log 2 + \dots + \log n$$

$$0 \leq \log n!$$

$$0 \leq 1 \leq \log n!$$

$$c = 1$$

$$f(n) = n^{\log n} \qquad g(n) = 2^{\sqrt{n}}$$

$$n^{\log n} \sim 2^{\sqrt{n}}$$

$$\log\left(n^{\log n}\right) \sim \log\left(2^{\sqrt{n}}\right)$$

$$\log n \cdot \log n \sim \sqrt{n} \cdot \log 2 \qquad \log n > \log 2$$

$$\log n \sim \sqrt{n}$$

$$\lim_{n \to \infty} \left(f(n) - g(n)\right) \begin{cases} 0 \\ \infty \\ -\infty \end{cases}$$

$$\lim_{n \to \infty} \frac{f(n)}{g(n)} \begin{cases} 1 & \text{iguales} \\ 0 & g(n) \gg f(n) \\ \infty & f(n) \gg g(n) \end{cases}$$

$$\lim_{n \to \infty} \frac{\log n}{\sqrt{n}} \; \frac{\infty}{\infty} \longrightarrow \lim_{n \to \infty} \frac{\frac{1}{n}}{\frac{1}{2\sqrt{n}}} = \lim_{n \to \infty} \frac{2\sqrt{n}}{n} = 2 \lim_{n \to \infty} \frac{1}{\sqrt{n}} = 0$$