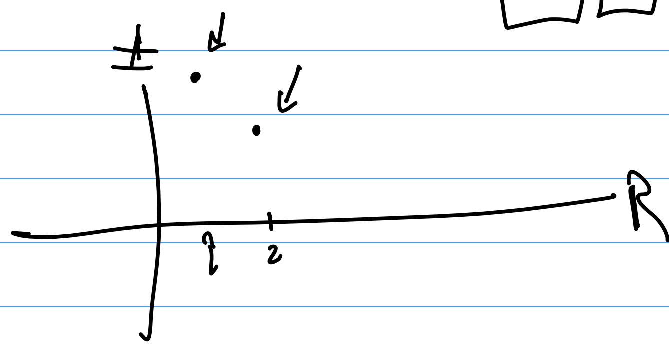
Análisis de Algoritmos

Alg: Secuencia "finita" de pasos

$2+3i \;?\; 1+4i \qquad \underbrace{5}+\underbrace{5i} > \underbrace{4}+\underbrace{2i}$

Nota:



$V \geq W \iff \forall i \; V_i \geq W_i$

$V <> W \iff \exists\, i,j \;/\; V_i < W_i$
$V_j > W_j$

O

Análisis:
- Estudio
- Interpretación
- medir → Complejidad temporal → # de pasos $\quad O(n)$
  - " espacial → Memoria
- observar →
- probar matemáticamente
- comparar

$$\lim_{n \to \infty} g(n)$$

$$\binom{n}{k}$$

Combinaciones
Coeficiente binomial

$$\begin{array}{ccccccc} & & & \binom{0}{0} & & & \\ & & \binom{1}{0} & & \binom{1}{1} & & \\ & \binom{2}{0} & & \binom{2}{1} & & \binom{2}{2} & \\ \binom{3}{0} & & \binom{3}{1} & & \binom{3}{2} & & \binom{3}{3} \end{array}$$

$$(a+b)^0$$
$$(a+b)^1$$
$$(a+b)^2$$
$$(a+b)^3$$

$$\begin{array}{ccccccc} & & & 1 & & & \\ & & 1 & & 1 & & \\ & 1 & & 2 & & 1 & \\ 1 & & 3 & & 3 & & 1 \end{array}$$

$$(a+b)^n = \sum_{i=0}^{n} \binom{n}{i} a^{n-i} \cdot b^i$$

$$(a-b)^n = (a+(-b))^n$$

$$\binom{n}{k} \begin{cases} 1 & \text{si } k=0 \\ 1 & \text{si } n=k \\ \binom{n-1}{k} + \binom{n-1}{k-1} & \end{cases}$$

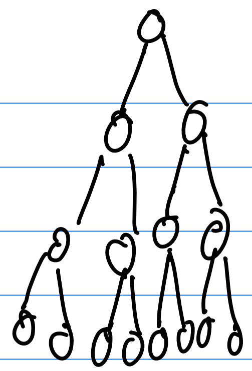
$$2^n$$

$$\binom{4}{2}$$

$$\binom{3}{2} + \binom{3}{1}$$

$$\binom{2}{2} + \binom{2}{1} \quad \binom{2}{1} + \binom{2}{0}$$

$$\binom{1}{1} + \binom{1}{0} \quad \binom{1}{1} + \binom{1}{0}$$



$\longrightarrow 2^0$

$\longrightarrow 2^1$

$\longrightarrow 2^2$

$\longrightarrow 2^3$

$\vdots$

$n \longrightarrow 2^{n-1}$

$$\sum_{i=0}^{n-1} 2^i = \underline{2^n - 1}$$

$$\frac{1(2^n - 1)}{(2-1)}$$

$q \quad r \quad n$

$$S = q + \cancel{qr} + \cancel{qr^2} + \cancel{qr^3} + \dots + \cancel{qr^n}$$

$$Sr = \cancel{qr} + \cancel{qr^2} + \cancel{qr^3} + \cancel{\dots} + \cancel{qr^n} + qr^{n+1}$$

$$Sr - S = qr^{n+1} - q$$

$$S(r-1) = q(r^{n+1} - 1)$$

$$S = \boxed{\frac{q(r^{n+1}-1)}{(r-1)}}$$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

$$\binom{4}{2} = \binom{3}{2} + \binom{2}{1} + \binom{1}{0}$$

$$\binom{2}{2} + \binom{1}{1} + \binom{0}{0}$$

$$\binom{1}{1} + \binom{0}{0}$$

$$\binom{n}{k} \begin{cases} 1 & \text{si } k=0 \\ 1 & \text{si } n=k \\ \sum_{i=0}^{k} \binom{n-i-1}{k-i} \end{cases}$$

n^3 ✓

$$\sum_{i=0}^{n} i^2$$

$$1^2 + 2^2 + 3^2 + 4^2 + \dots + n^2$$

$$\frac{n(n+1)(2n+1)}{6} = n^3 + \dots$$

$$n! = \prod_{i=1}^{n} i$$

$\{a, b, c\}$

abc
acb
bac
bca
cab
cba

$\} \; 3!$

$\underline{3} \cdot \underline{2} \cdot \underline{1}$

$0! = 1$

$\{a, b, c, d, e\}$

60

$\underline{5} \cdot \underline{4} \cdot \underline{3}$ $\quad {}_5P_3$

$$nP_K = \frac{n!}{(n-K)!} = \frac{\cancel{1 \cdot 2} \cdot 3 \cdot 4 \cdot 5}{\cancel{1 \cdot 2}}$$

$$nC_K = \binom{n}{k} = \frac{n!}{(n-K)! \cdot K!}$$

n