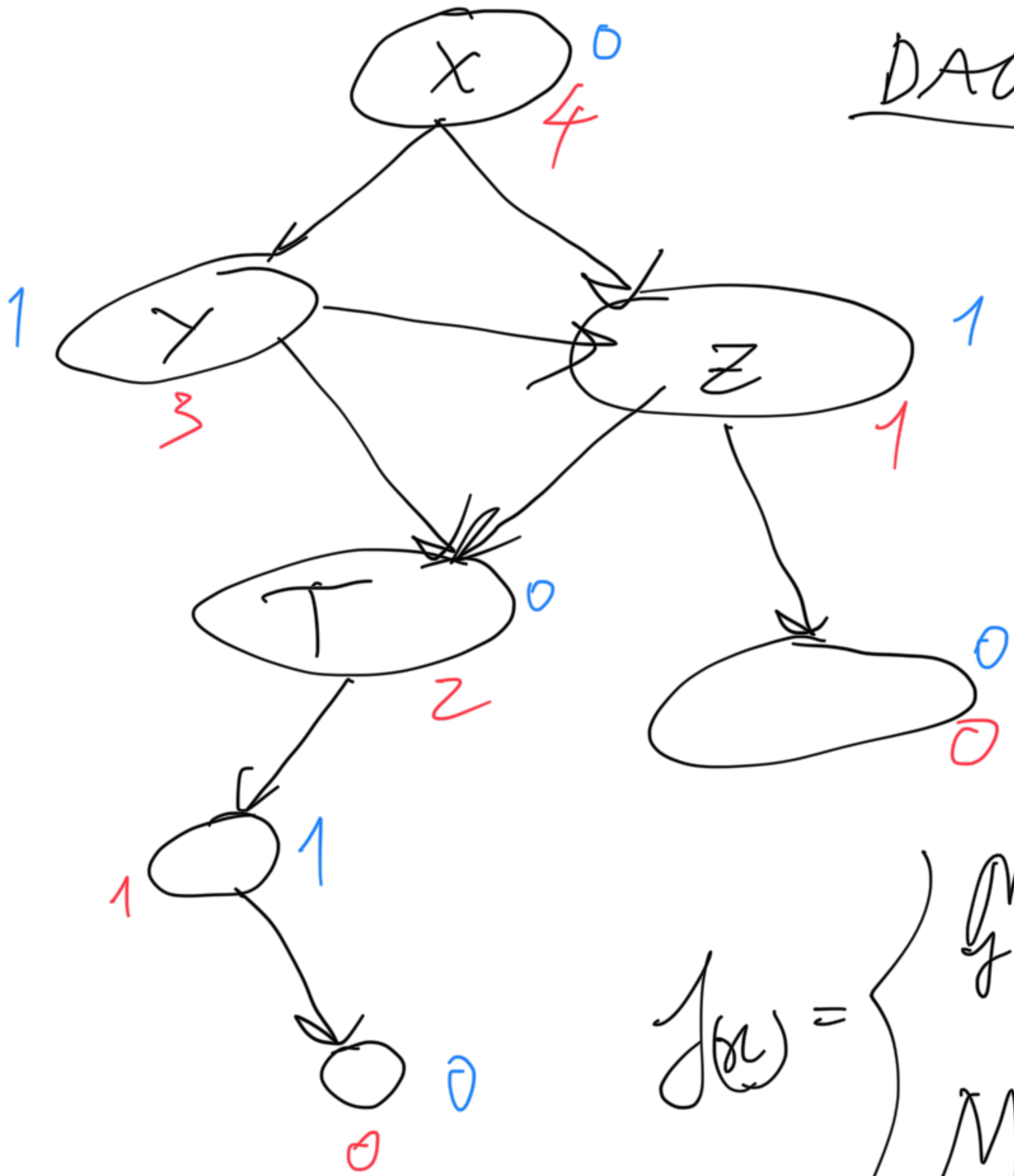


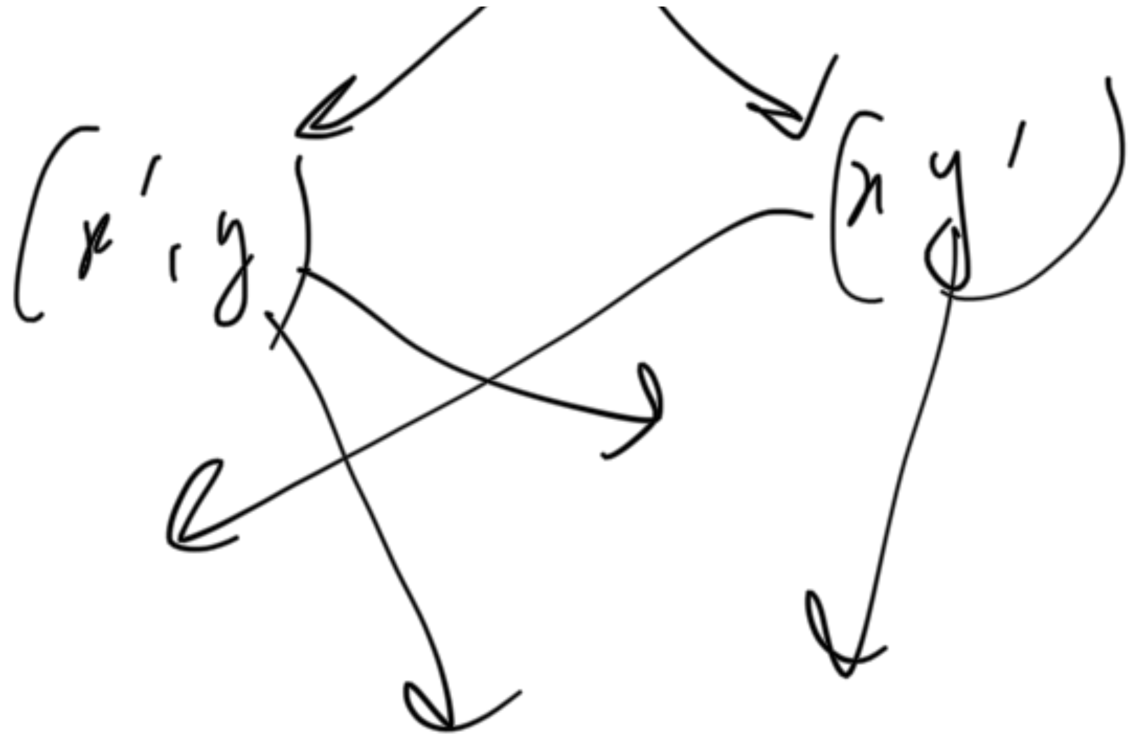
<u>DAG</u>

$$O(m+n)$$

$$f(x) = \begin{cases} \min\limits_{y \in N(x)} (f_y + 1) : \text{Thg} \\ \text{Max}(f_y + 1) : \text{Tha} \end{cases}$$

(x, y)

<u>DAG</u>:



$O(mn)$

+ SX giảm theo a.

+ $f(i, j)$:

f_{ij} ? $= j$

b_i

$\Rightarrow O(n.S)$

$f(i, \frac{S}{a})$

$x \mid S_i \quad x \le a_i$

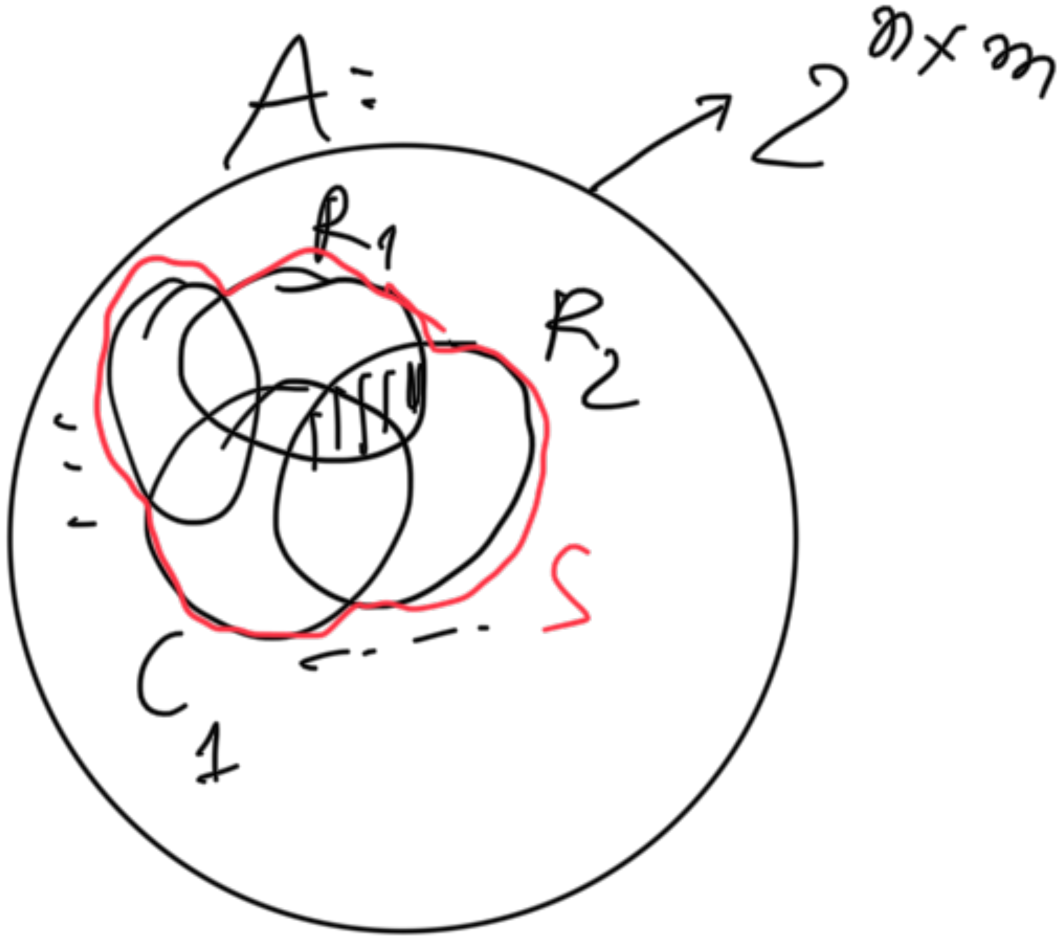
$|A \cup B \cup C| = A + B + C$

$$-|A\cap B| - |B\cap C| - |C\cap A|$$
$$+|A\cap B\cap C|$$

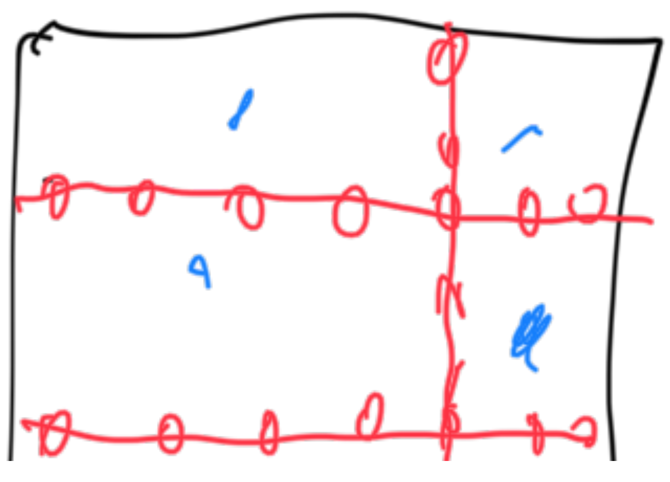
R_i : Tập các mT | dòng $i = 0$.

C_j ——————— cột $j = 0$.

$S = R_1 \cup R_2 \cdots \cup R_n \cup C_1 \cdots \cup C_m$



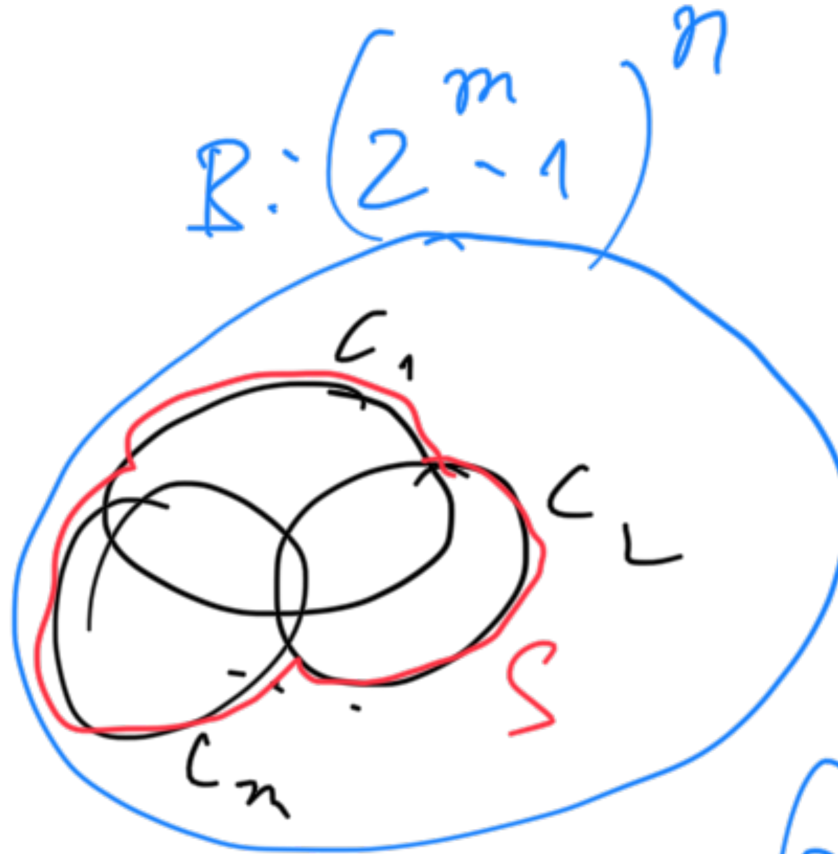
$$|R_i \cap R_j \cap C_t| = 2^{(n-2)(m-1)}$$



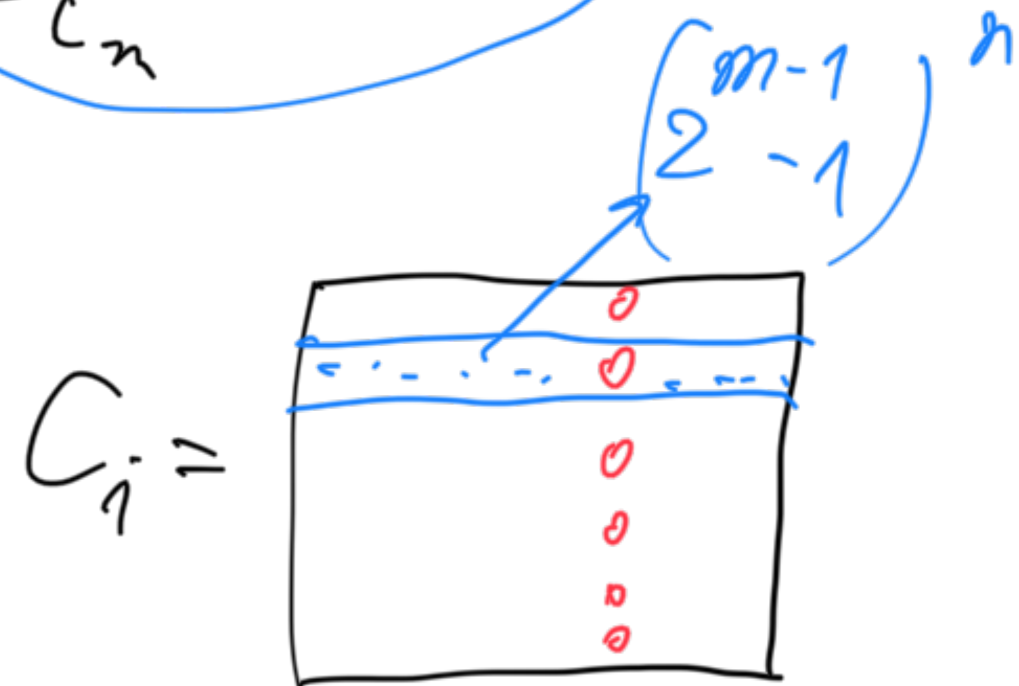
$i \neq j \neq 0$

$$S = \sum_{i=0}^{n}\sum_{j=0}^{m} C_n^i C_m^j (-1)^{i+j+1} \, 2^{(n-i)(m-j)}$$

$$\Rightarrow O(n \times m)$$



C_i : Tập các MT / 0 có dòng nào = 0, cột i = 0.



$$S = C_1 \cup C_2 \dots \cup C_m$$

$$= \sum_{i=1}^{m} (-1)^{i+1} C_m^i \left(2^{m-i} - 1\right)^n \Rightarrow O(m \log n)$$

$a_1 \quad a_2 \quad \dots \quad a_n$

$G = a_1 \wedge a_2 \wedge \dots \wedge a_n$

$G = 0$ thì thua

$\exists \qquad \forall$

$G \neq 0$ thì thắng

$a_1 = 0110\,1101$

$a_2 = 101\,001$

$a_i = 0101\,1\,010$

$a_n = 10\,1101$

$G = 000\,1\,0110$

$G' = G \wedge a_i \wedge a_i'$

$G' = 0 \rightarrow a_i' = G \wedge a_i$

$a_i > (G \wedge a_i)$

<u>Nim game.</u>

t

$a_1 = 01\,1\,0\,110$

$G = 0$ thì thua

$G \neq 0$ thì thắng

$\oplus\ S = \emptyset$

$\oplus$ for t giảm dần

- $\#1 \geq g_t$: tắt g_t bit
- $\#1 < g_t$; $|S| + g_t - \#1 \leq k$: bổ sung thêm $1 \to 0$, tắt đi
- $\#1 < g_t$; $|S| + g_t - \#1 \geq k+1$

$\iff \#0 + g_t \geq k+1$

$a_2 = 0\ 1\ 0\ 0\ 1\ 0\ 1$

$\vdots$

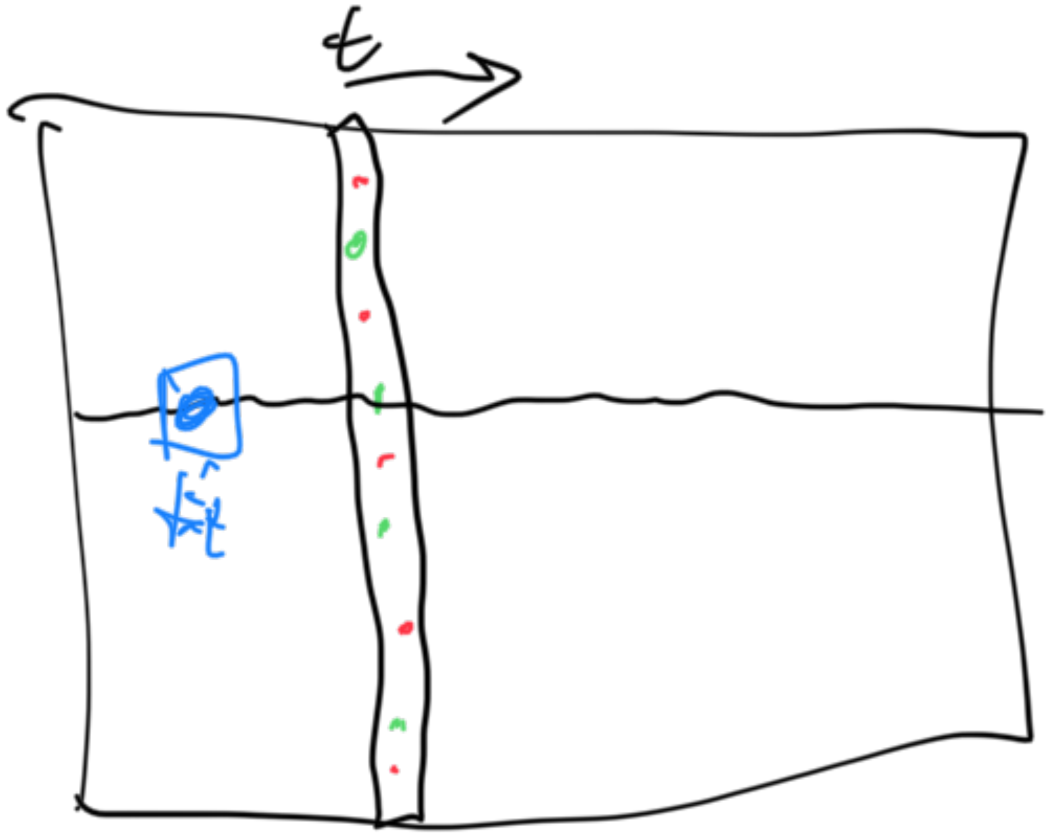
$a_n = 1\ 0\ 1\ 1\ 0\ 1\ 0$

sum % $(k+1)$

$\downarrow$

g

$G = g_t g_{t-1} \ldots g \ldots g_0.$



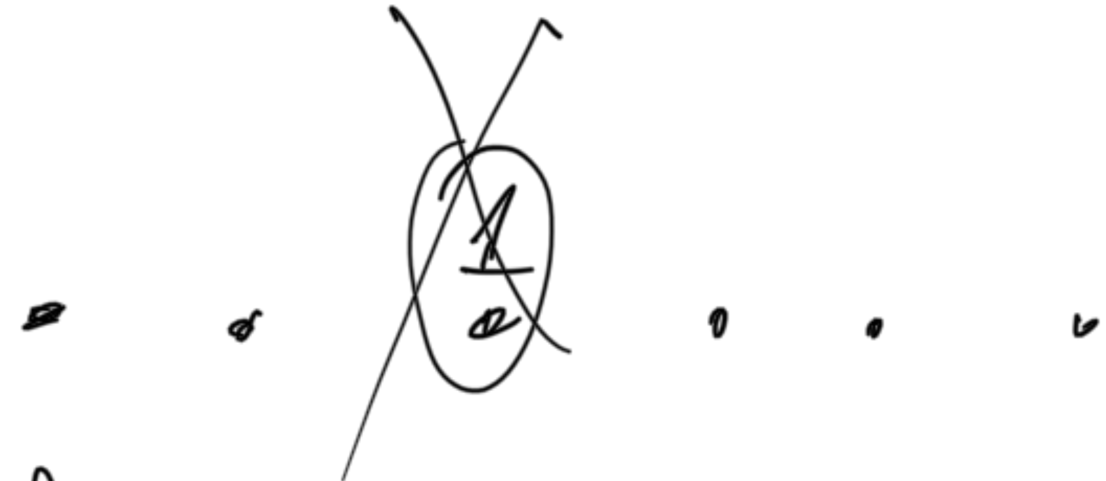
$g_t \to 0$

$g_t \to k+1$

⇒ S là tập cần tìm

---

x_1 : vị trí 1.



$1 \le x_1 \le n$

⇒ $x_1 - 1$ nghịch thế

x_2 : vị trí 2.

$1 \le x_2 \le n - 1$

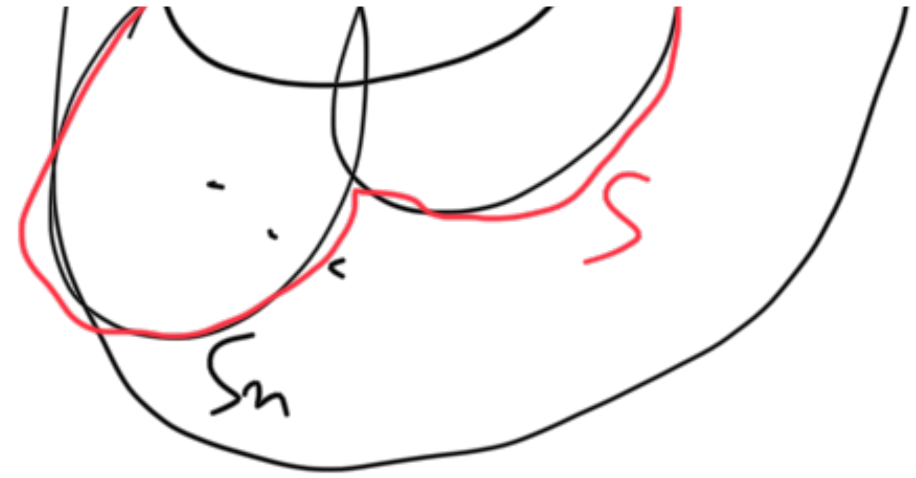
⇒ $x_2 - 1$ nghịch thế.

$$\Rightarrow \begin{cases} x_1 - 1 + x_2 - 1 + \dots + x_n - 1 = k \\ 1 \le x_i \le n - i + 1 \end{cases}$$

$k \to n$ x.

$$\Leftrightarrow \begin{cases} x_1 + x_2 + \dots + x_n = k \\ 0 \le x_i < i \end{cases}$$

Chia k kẹo cho n /



$x_i < i$

S_i là tập các cách chia / $x_i \geq i$

$$S = S_1 \cup S_2 \cdots \cup S_n$$

$$\left| \underbrace{S_2 \cap S_3 \cap S_7}_{X} \right| = \left(k - 12 \longrightarrow n \right)$$

$$= \sum_{X=1}^{k} \left(k - X \longrightarrow n \right) . f(X)$$

$f(x)$: Số tập con $\{1, 2, 3 \ldots, n\}$

có tổng $= x$.

(chẵn $-$, lẻ $+$)

$O(k\sqrt{k})$

. $A = \emptyset$

. OA ; $++A$ (a)

(b)

. $++A$