Editorial

15:00

Don't discuss today's Contest in public (on Codeforces e.g.) for two weeks

A D_1 digits in B_1 system

D_2 digits in B_2 system

$$B_1^{D_1 - 1} \leq x < B_1^{D_1}$$

$$B_2^{D_2 - 1} \leq x < B_2^{D_2}$$

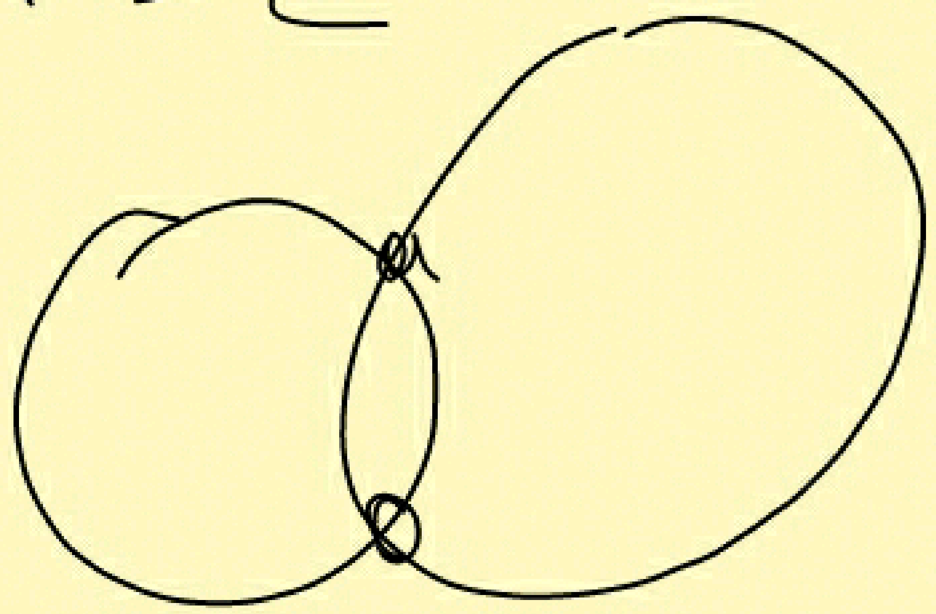
B

$O_1(x_1 \ldots x_n)$

$O_2(x'_1 \ldots x'_n)$

$n=2$

answer=2



answer

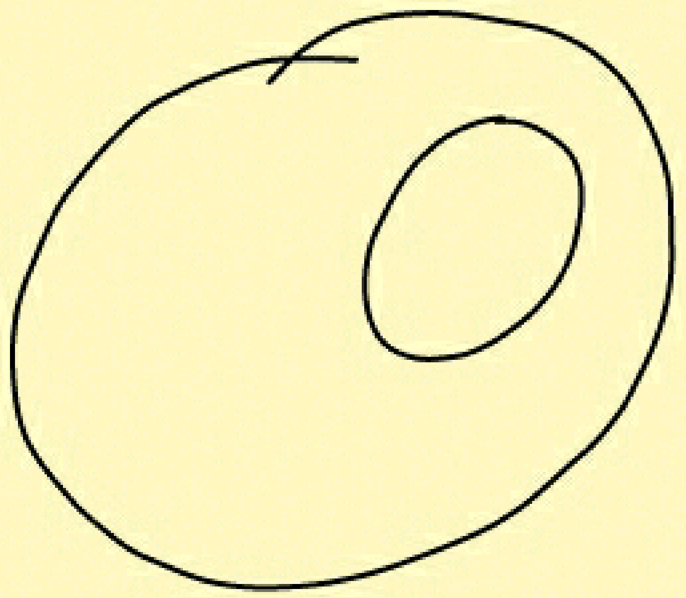
$0 \quad dist(O_1, O_2) > R_1 + R_2$

$1 \quad dist(O_1, O_2) = R_1 + R_2$

$\infty \quad dist(O_1, O_2) < R_1 + R_2$

$dist(O_1, O_2) + R_1 >$

R_2



C $(3 - (4 \cdot k + m - \ell) \cdot 3)$

D

$n = 1$ $\quad 0, 1$

$n = 2$ $\quad 00, 01, 10, 11$

$n \geq 3$ $\quad n \to n+2$

$2^n \to$ len $= n+2$

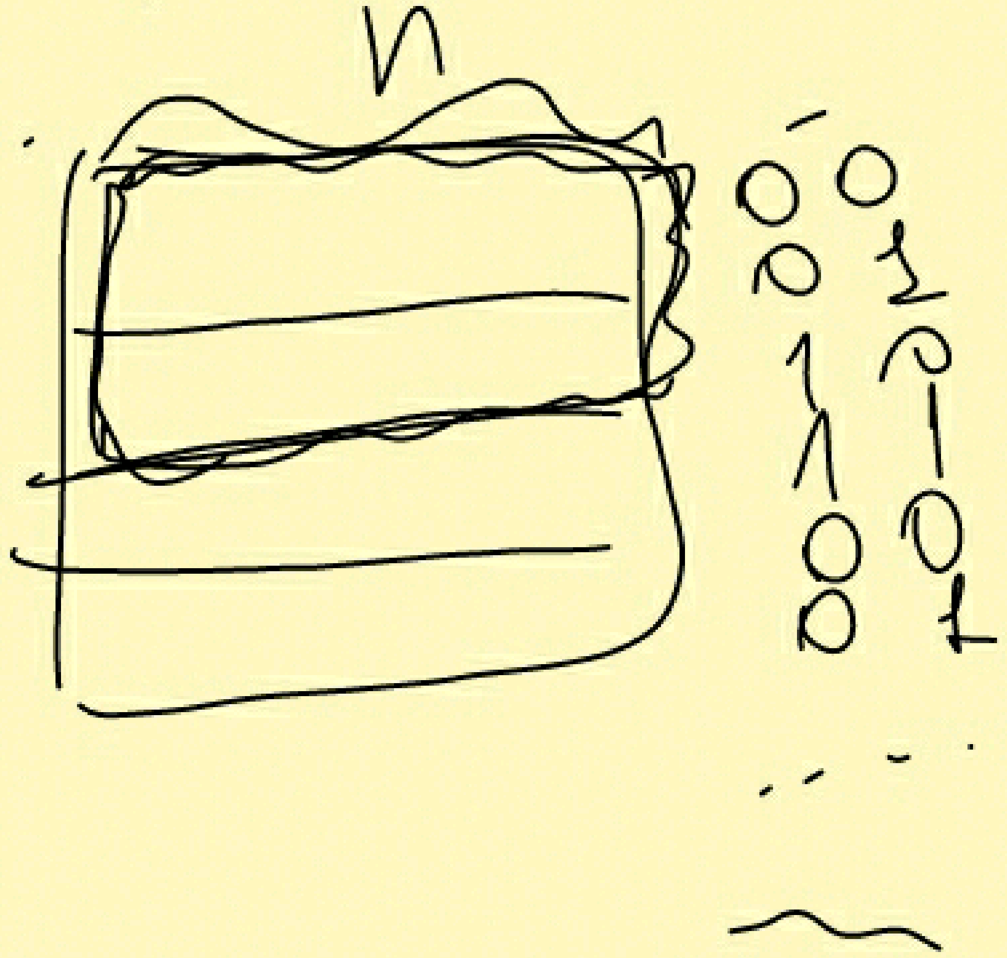
$\Downarrow$

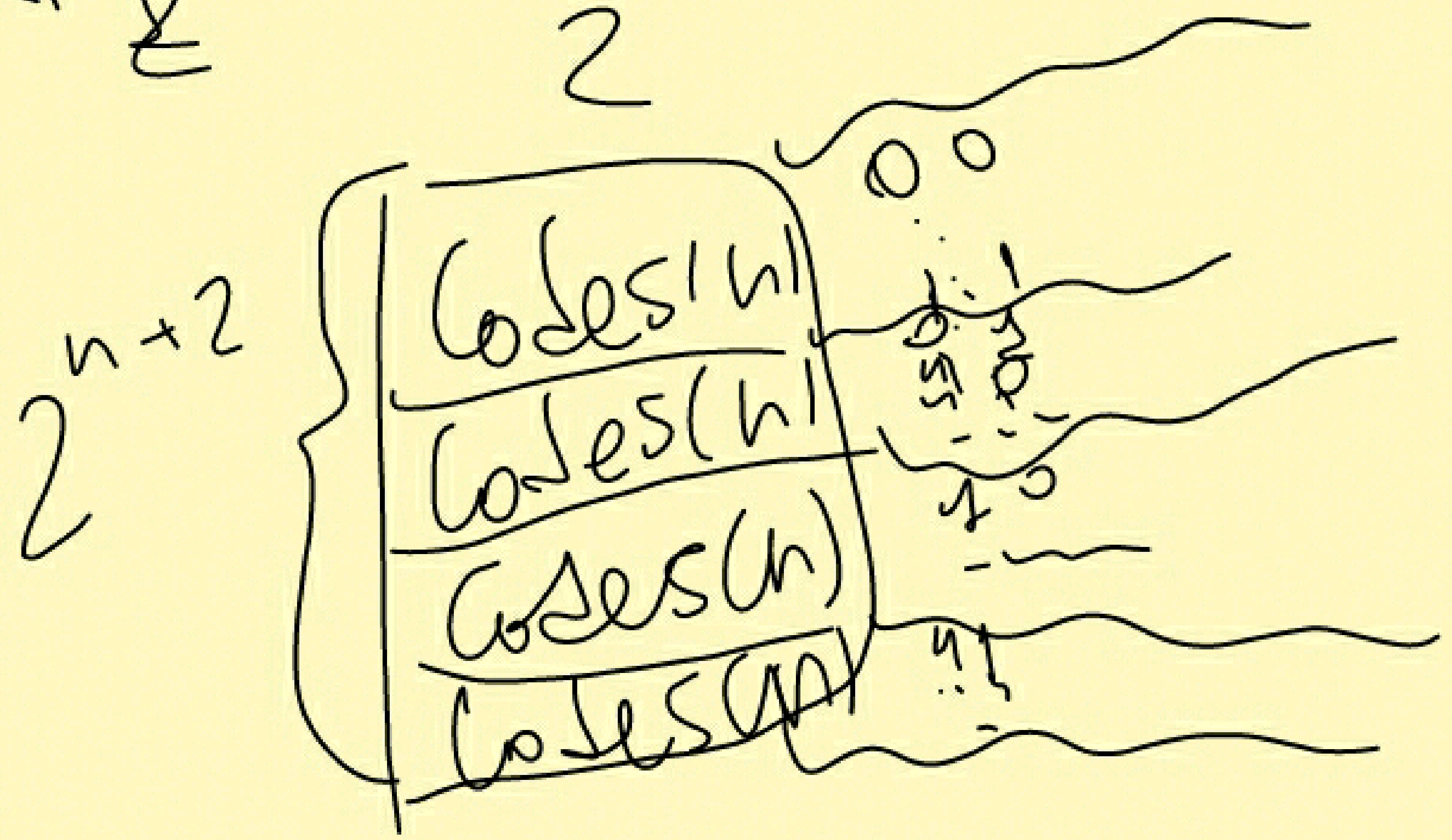
2^{n+2} len $= n+2$

$2^n : 4$

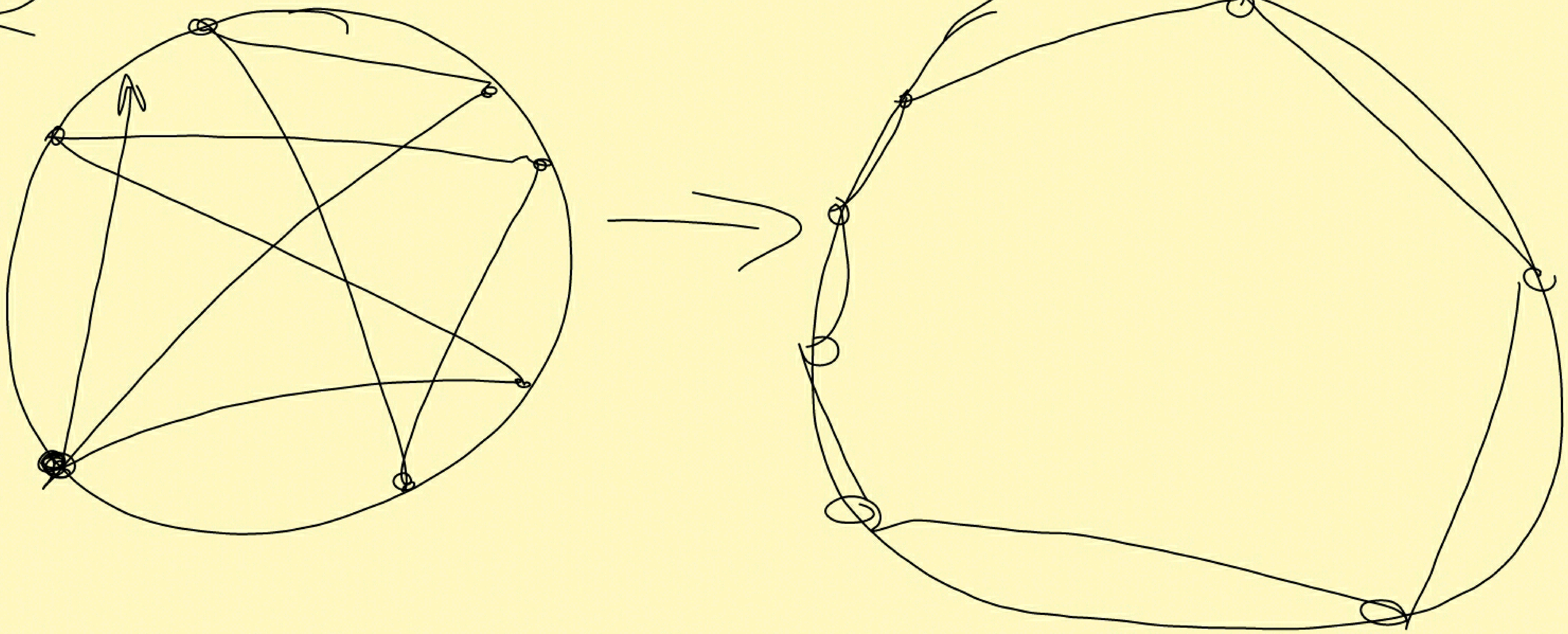
$n+2$ $\quad \frac{n+2}{2}$

Codes(n) $\to$

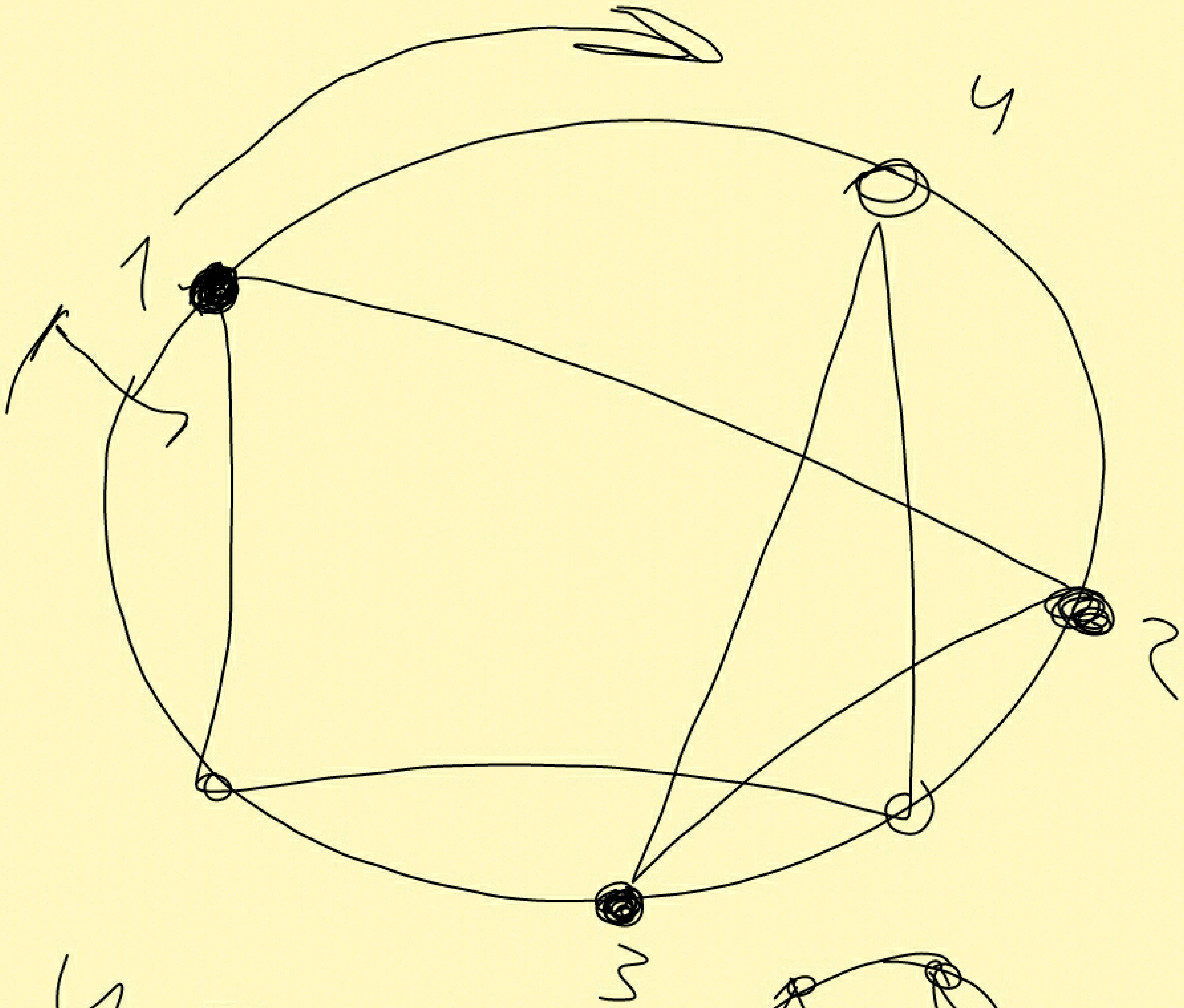


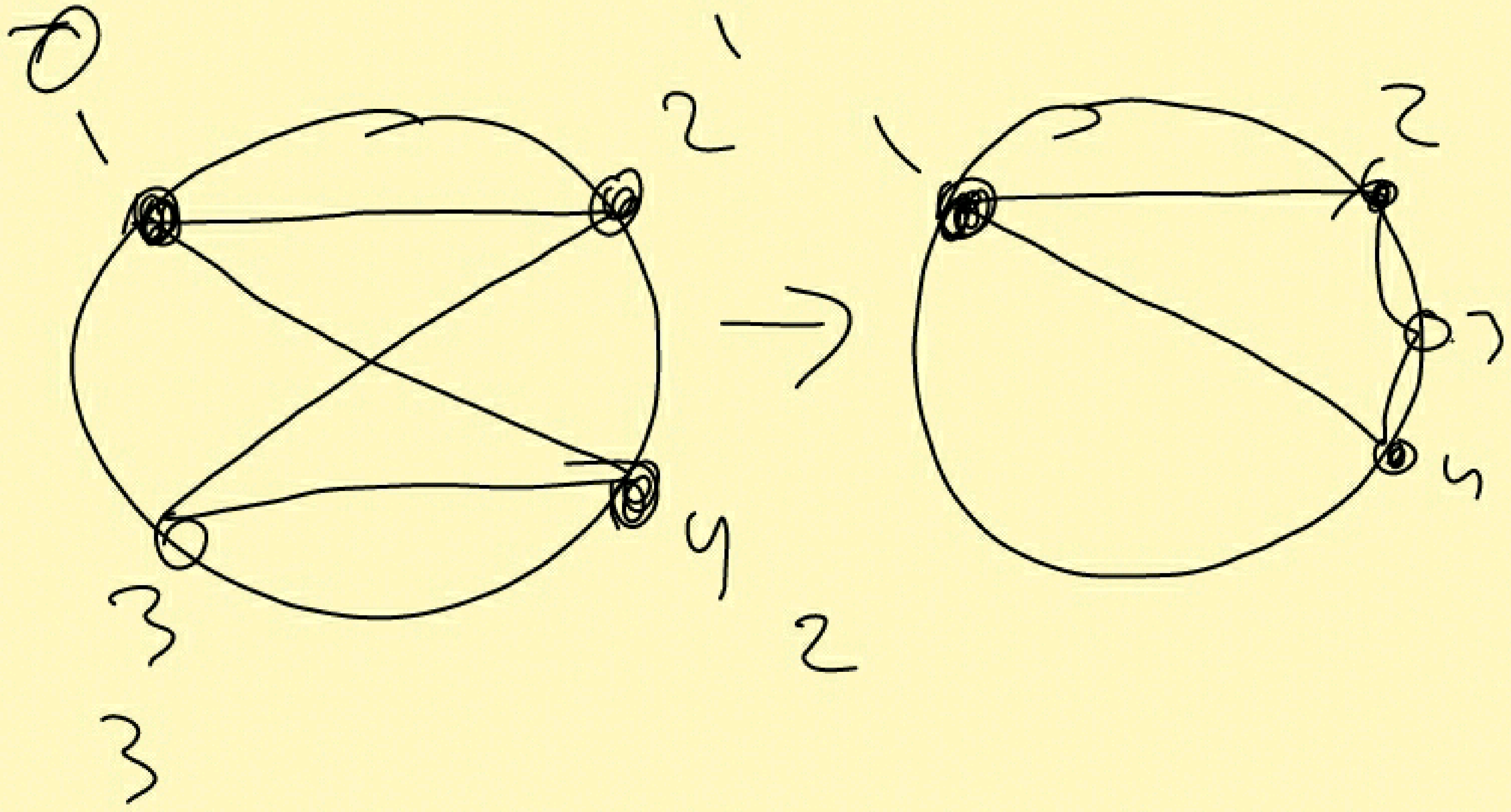


E

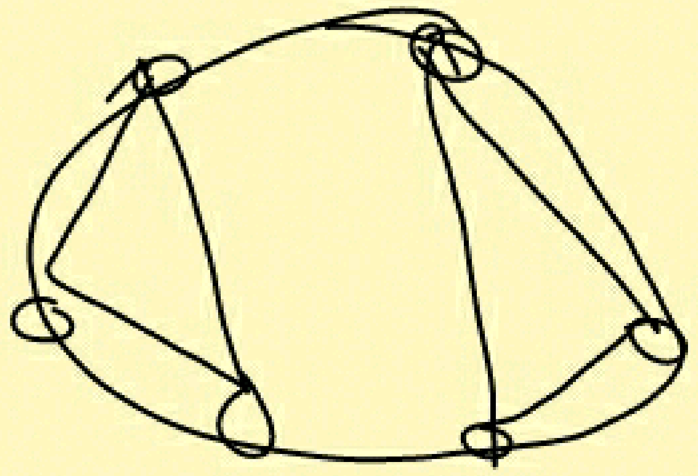


$n \cdot n^2$





1 4 2 3



1 2 4 3

(F) n items

$a_1, \dots, a_n \le W$

$a_1 \dots a_{i-1}$ a_i $a_{i+1} \dots a_n$

first missing

$\underline{a_1 \le} a_2 \dots \le a_n$

$S_i = \sum_{j=0}^{i-1} a_j$

size of knapsack

$x + a_i > W$

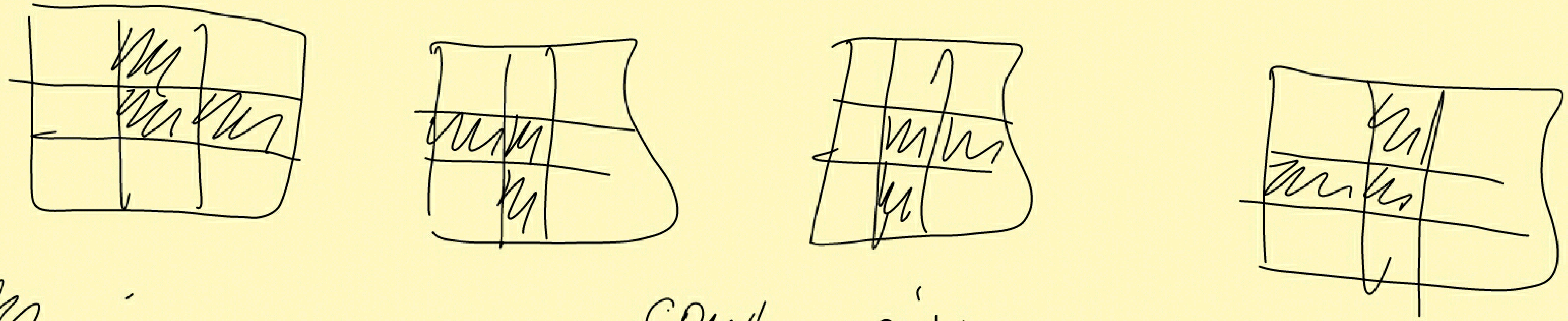
$x \,\cancel{\ge}\, W - a_i$

$d_{i,j}$ — ~~#~~ ways choose items with sum j and items $\ge a_{i0}$ $O(nW)$

$\cancel{x}\; W - a_i - S_i$

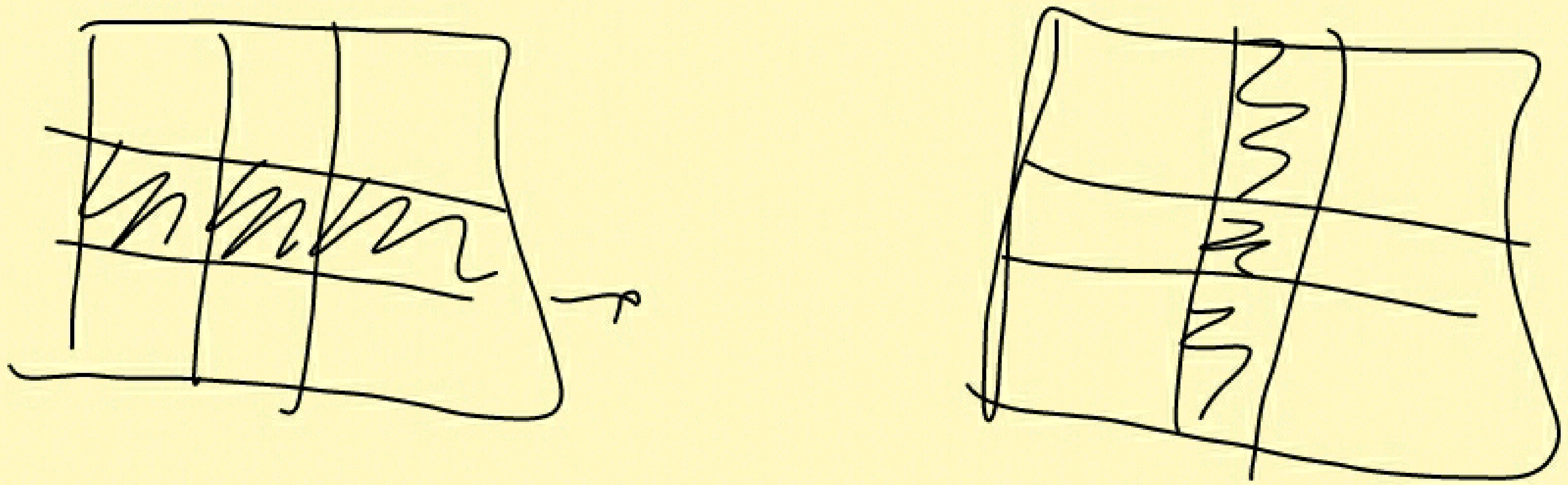
$x > W - a_i - S_i$

G • + ∗

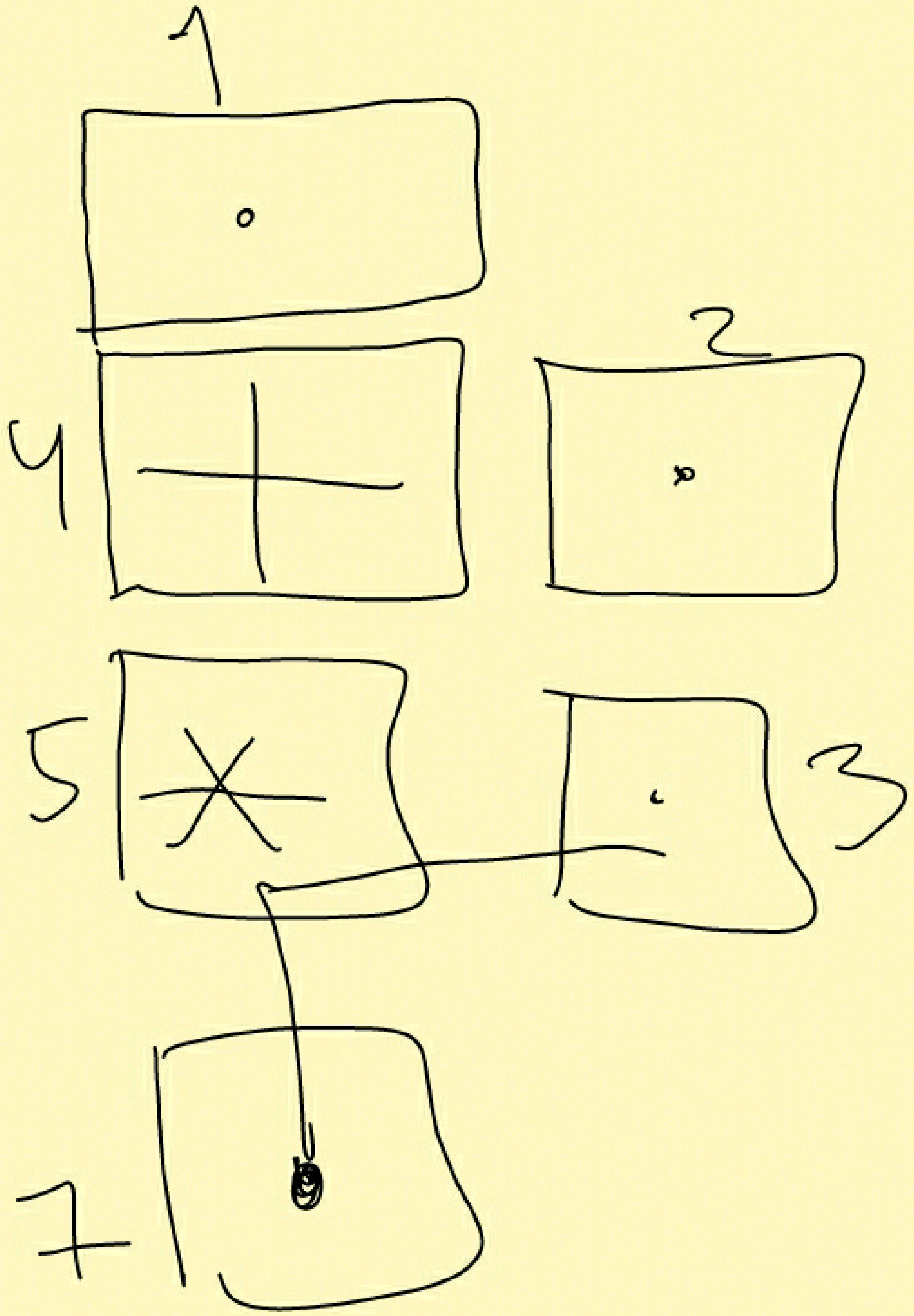


M in •

center either + or ∗

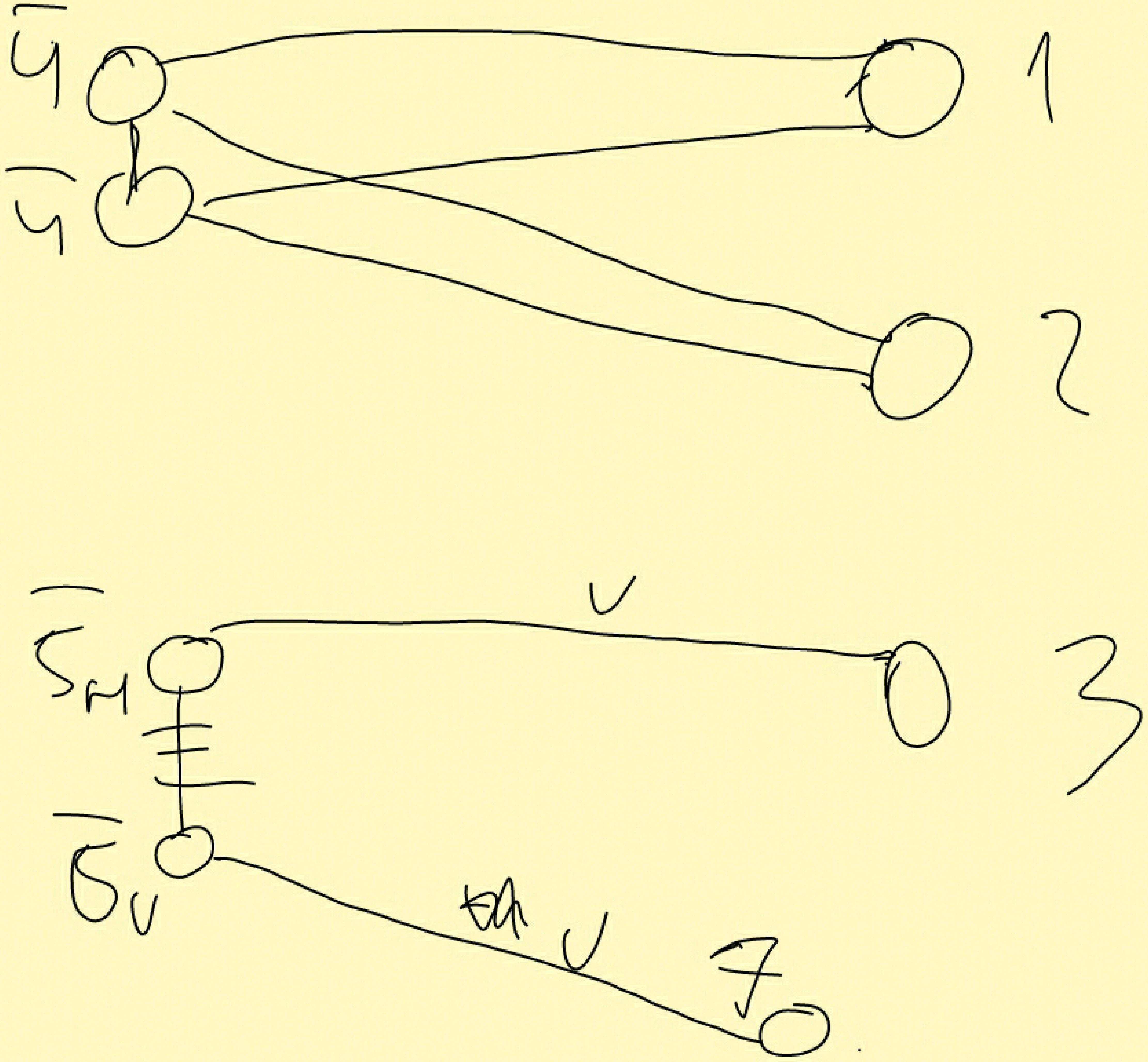


← center in +



1
4
2
5
3
7

+, *



4
4
1
2
5
5
3
7
v
v

ans = maximal matching $- \#(+) - \#(*)$.

matching $\geq \#(+) + \#(*)$.

Blossom

~~Tutte matrix~~

$n \cdot m$

50ms

5000 10000

H

$$\min_{i_1, \dots, i_k} \max(a_{i_1} + a_{i_2}, \dots, a_{i_k} + a_{i_1})$$

j: a_j — minimal is present in the answer

minimum.

$a_0, a_1, \dots, a_{n-1}$.

(i) dp_j — min x such there is answer with length j ending at x.

$n \log n$

(j, dp_j) - points

$dp_{j'} \geq dp_j$ for $j' \geq j$

$n \log^2 n.$

I

find $a_1, \dots, a_n$: $\underline{a_{p_1} \le \dots \le a_{p_n}}$

$b_1, \dots, b_m$: $b_{q_1} \le \dots \le b_{q_n}$

K pairs $i < j$, $a_i + b_j < 0$

1) $a_i = b_i = 1 \Rightarrow K = 0$

2) $a_i = b_i = -1 \Rightarrow K = \frac{n(n-1)}{2}$

$q = 2\ 3\ 1\ 4 \Rightarrow b = \underline{3}\ \underline{1}\ \underline{2}\ \underline{4}$

$b = q^{-1}$

K

$a_i + b_i = 0$

$a = p^{-1} = \underline{2\ 1\ 3\ 4}$

$\downarrow$

$2\ \underline{-4}\ 3\ 4$

$\downarrow$

$\overset{-2}{-4}\ -4\ 3\ 4$

a: some -4

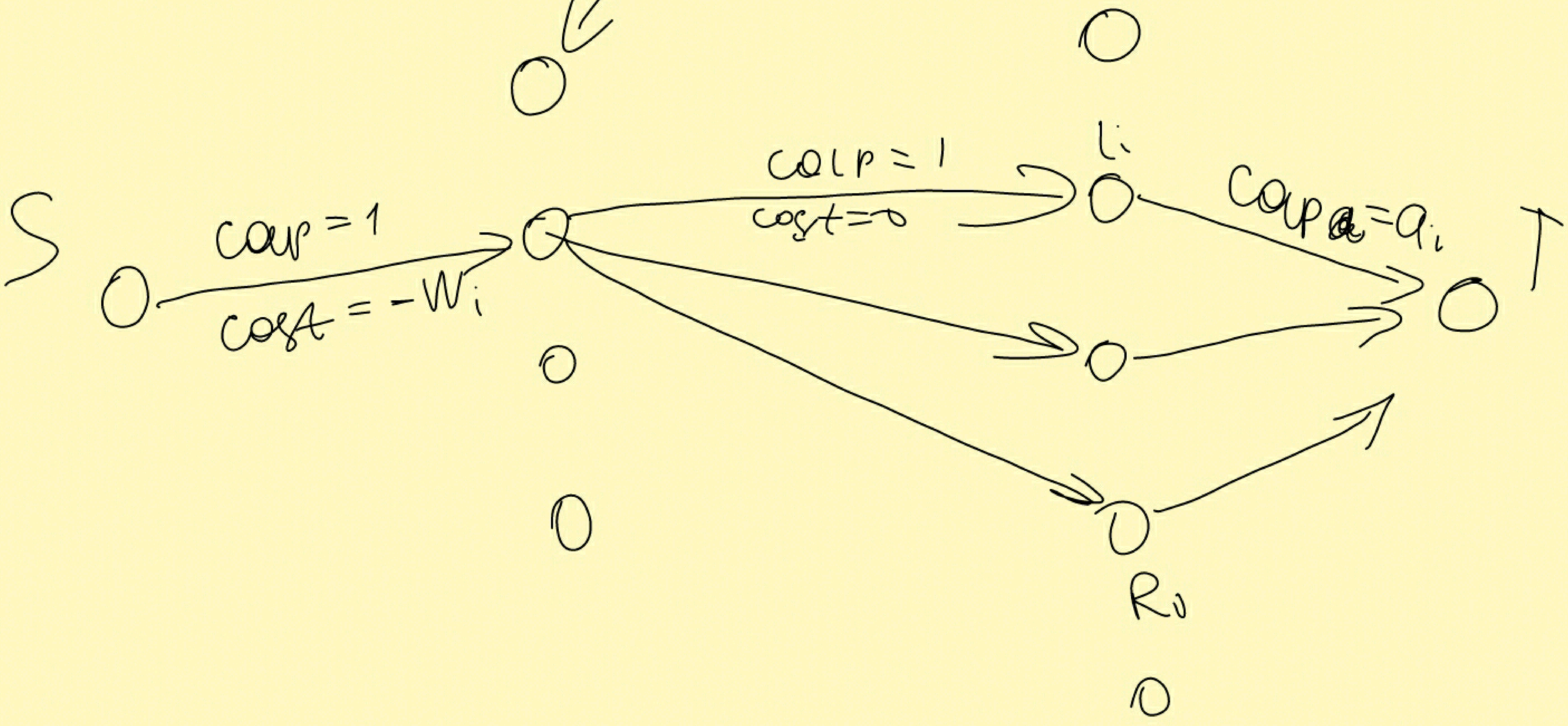
some positive

J

$a_1 \quad \underline{a_2} \, \ldots \; a_n$

sort by $\underline{w_i}$

$l_i \; R_i \; w_i$



matroids

fixed subset of segments

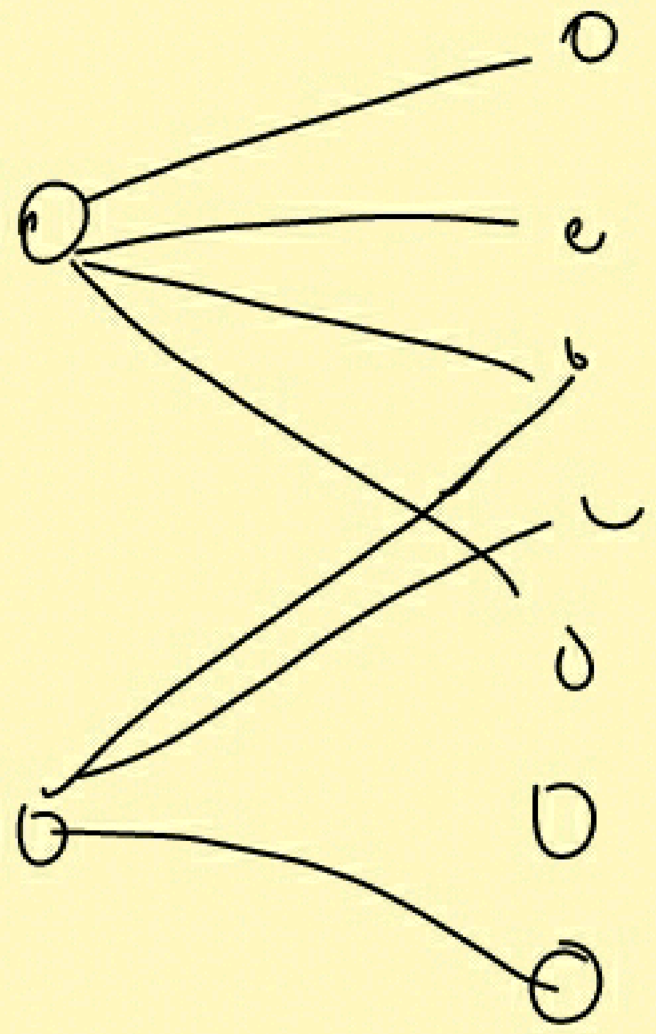
L_1, R_1

L_2, R_2

$\vdots$

L_k, R_k

matching



Hall lemma

for each r_j

find l_i: $r_j - l_i$ - number of segments is maximised

$\underline{\forall A \subset V}$: $|N(A)| \geq |A|$

sort segments

fix

for each (i, j) check if $j - i + 1 \geq \#([l_k, r_k] \subset (i, j))$

K expected walk ~~from~~ 1 to n.

$$(1\ 0\ 0 \dots 0)\ \underline{(E-A)^{-1}} \begin{pmatrix} 1 \\ 1 \\ 1 \\ \vdots \\ 1 \end{pmatrix} \qquad (E-A) = \underline{B}$$

$$C_0 + C_1 B + C_2 B^2 + \dots + \underline{C_n} B^n = 0 \qquad \text{annulying poly } P$$

$$z_i = \underline{(u_0\ u_1 \dots u_{n-1})} \cdot \underline{B}^i \cdot \begin{pmatrix} v_0 \\ v_1 \\ \vdots \\ v_{n-1} \end{pmatrix} \qquad \text{in } n \cdot \underline{m}$$

$$O\left(\frac{n}{F}\right) - \text{prob fail}$$

$c_0\ c_1 \dots c_k$:

$$u \cdot B^i \longrightarrow u \cdot B^{i+1}$$

$$\forall i \geq k: \sum_{j=0}^{k} z_{i-j} \cdot c_j = 0$$

$$c_0 \cdot \underline{B}^{-1} + \underline{c_1 + c_2 B + \dots + c_n B^{n-1}} = 0$$

$z_i = z_{i-1} \cdot c_1 + \dots$

$p_0 \cdot (E-A)^{-1} q$: B^{-1}. Hamilton-Kaly Theorem

$P(B)=0$, $\underline{x_n} B^n + \dots + x_0 B^0 = 0 \Rightarrow B^{-1} = \frac{-x_1 - x_2 B - \dots - x_n \cdot B^{n-1}}{x_0}$

Berlekamp-Massey

$u = (u_0 \dots u_{n-1})$
$v = (v_0 \dots v_{n-1})^T$ — Random,

$u \cdot B^i \cdot v$ — array

O(nm) time

$\vec{p}^2 \cdot A = \vec{p}$

$$\sum_{i=0}^{\infty} \underset{(1,0,\dots,0)}{p_0} \cdot A^i \cdot \underset{(1,\dots,1)}{q} = p_0 \left(\sum_i A^i\right) \cdot q =$$

$$\left(\sum p_0 \cdot x_i \cdot A^i\right) q$$