

Σ Pattern $\rightarrow \Sigma$ Text

$$|P_1| = m_1$$

$$|P_2| = m_2$$

- - -

$$|P_z| = m_z$$

$$O(n+m_1)$$

$$O(n+m_2)$$

- - -

$$O(n+m_z)$$

$$O\left(\sum_{i=1}^z n + \sum_{i=1}^z m_i\right) =$$

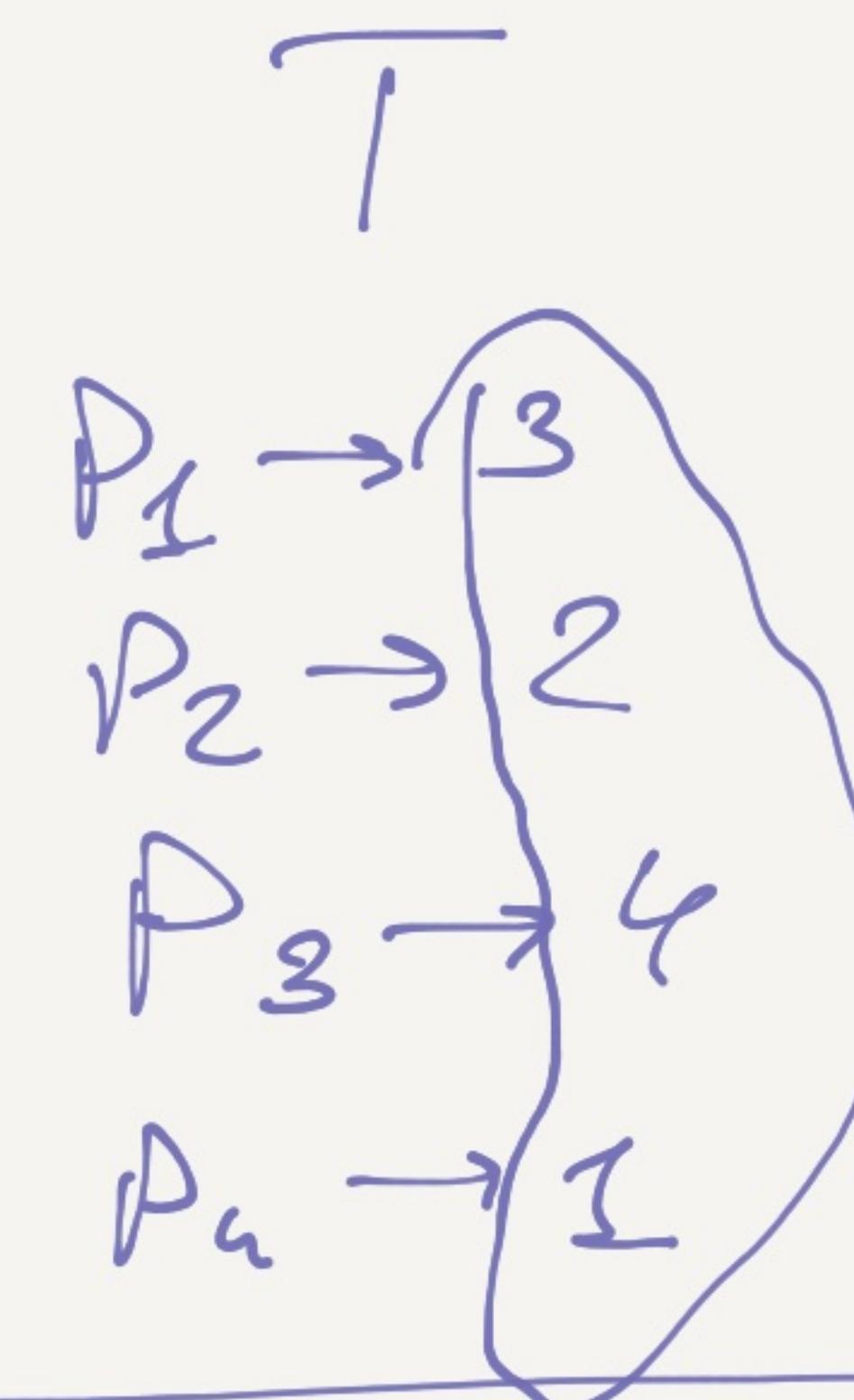
$$= O(n + m)$$

P_1 = theater

P_2 = tattoo

P_3 = potato

P_4 = other



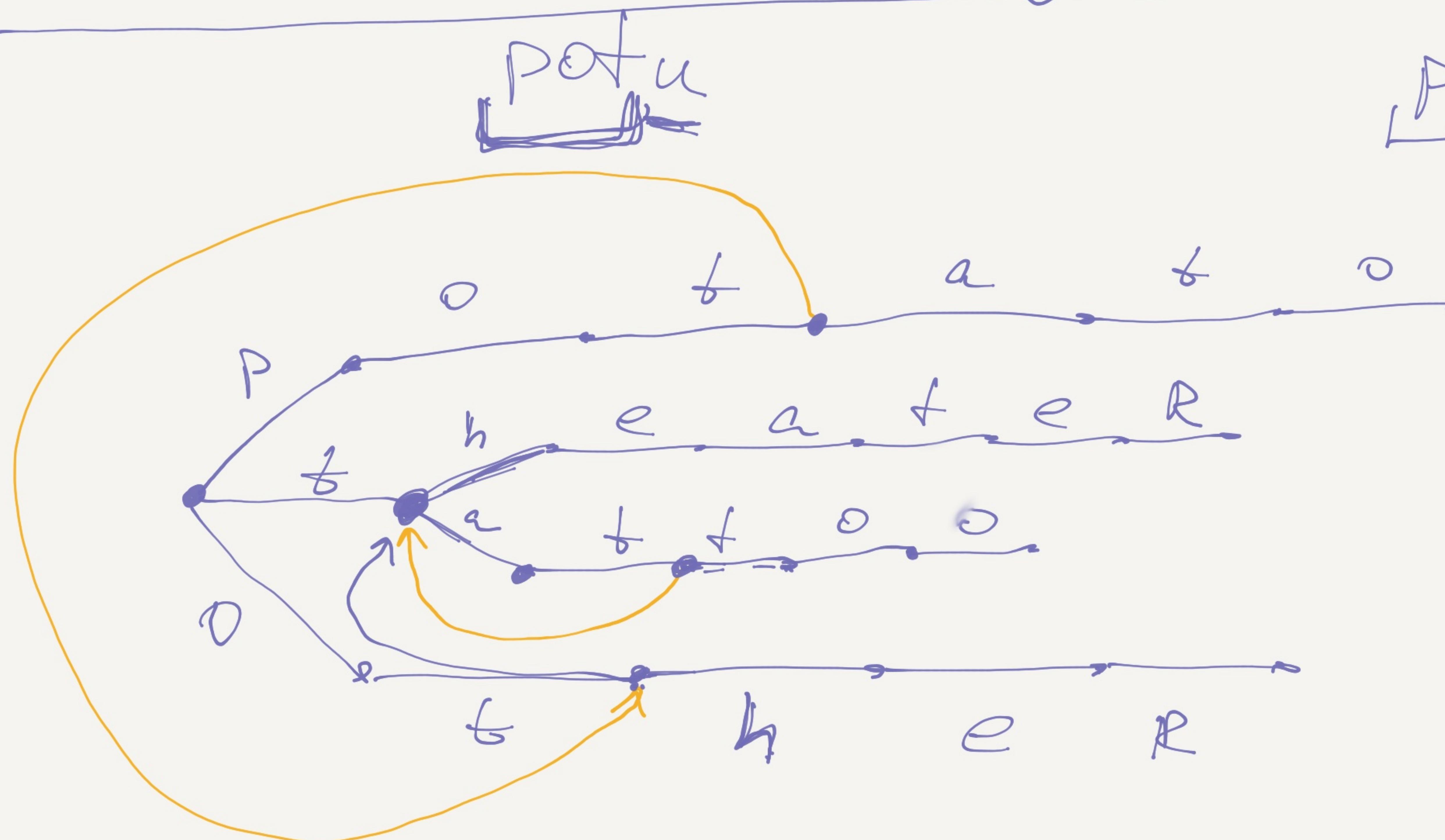
$$O(n + m + k)$$

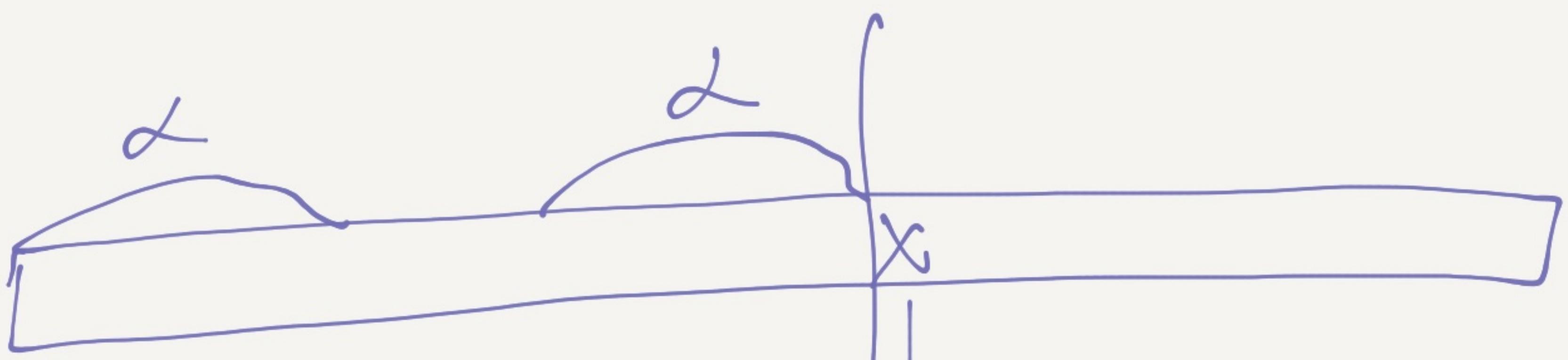
↓
11
24.6
↓
10

Potu

Potato

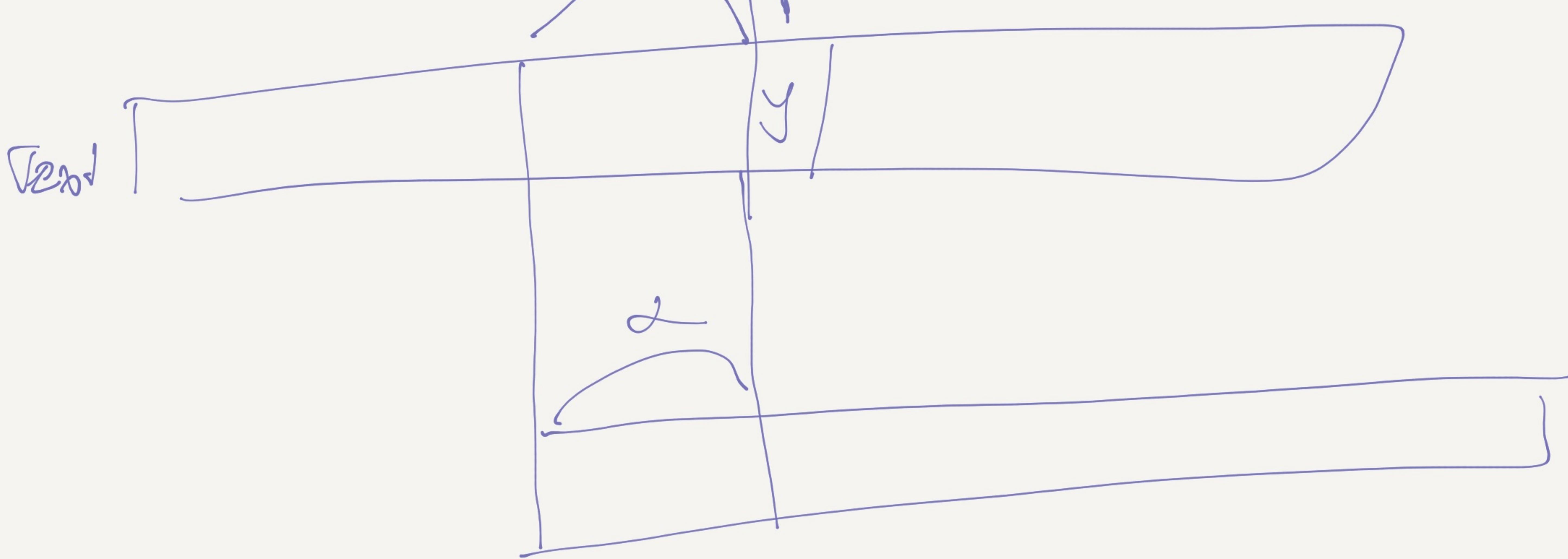
Tattoo



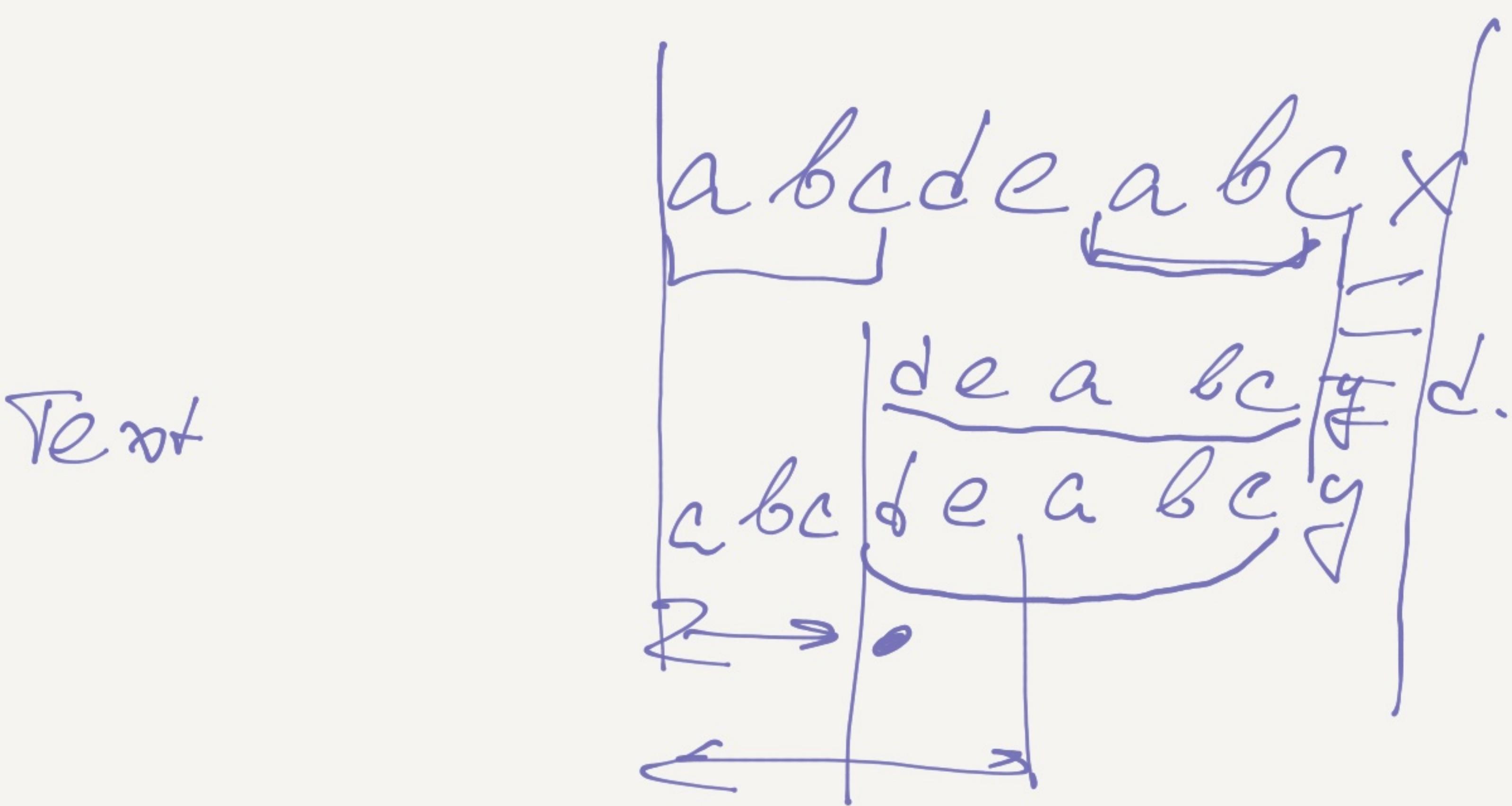
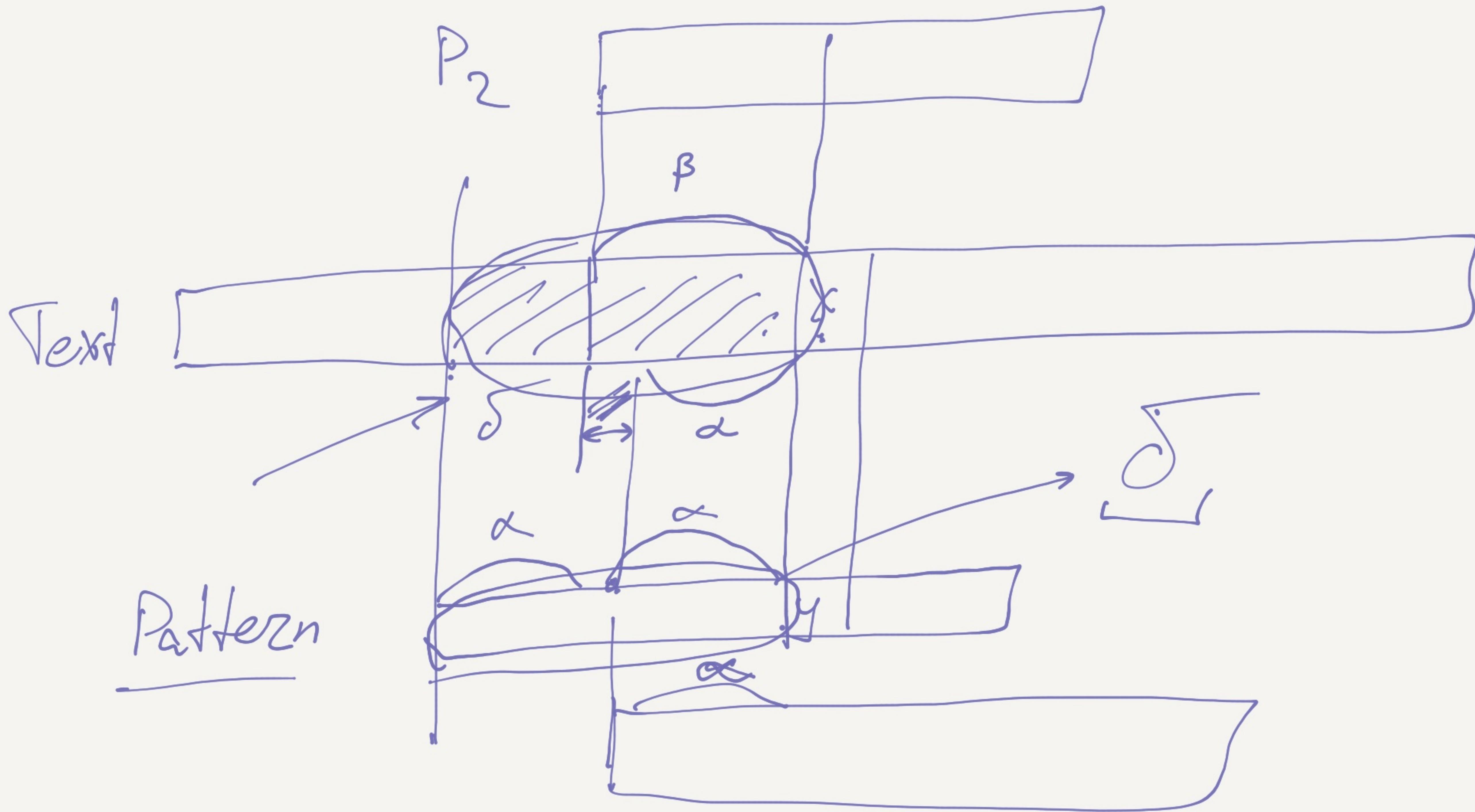


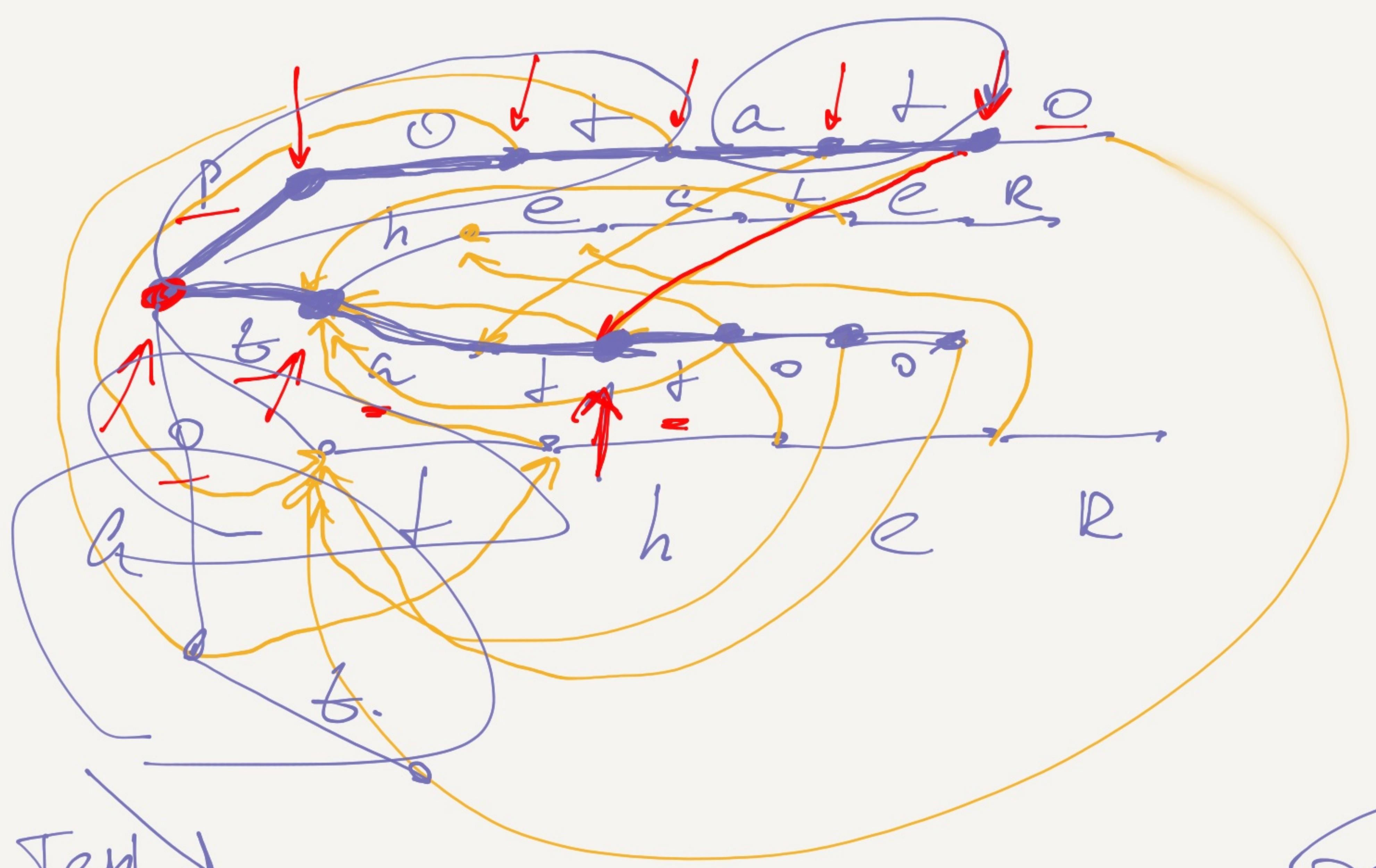
KMN

Pattern



V_{200}



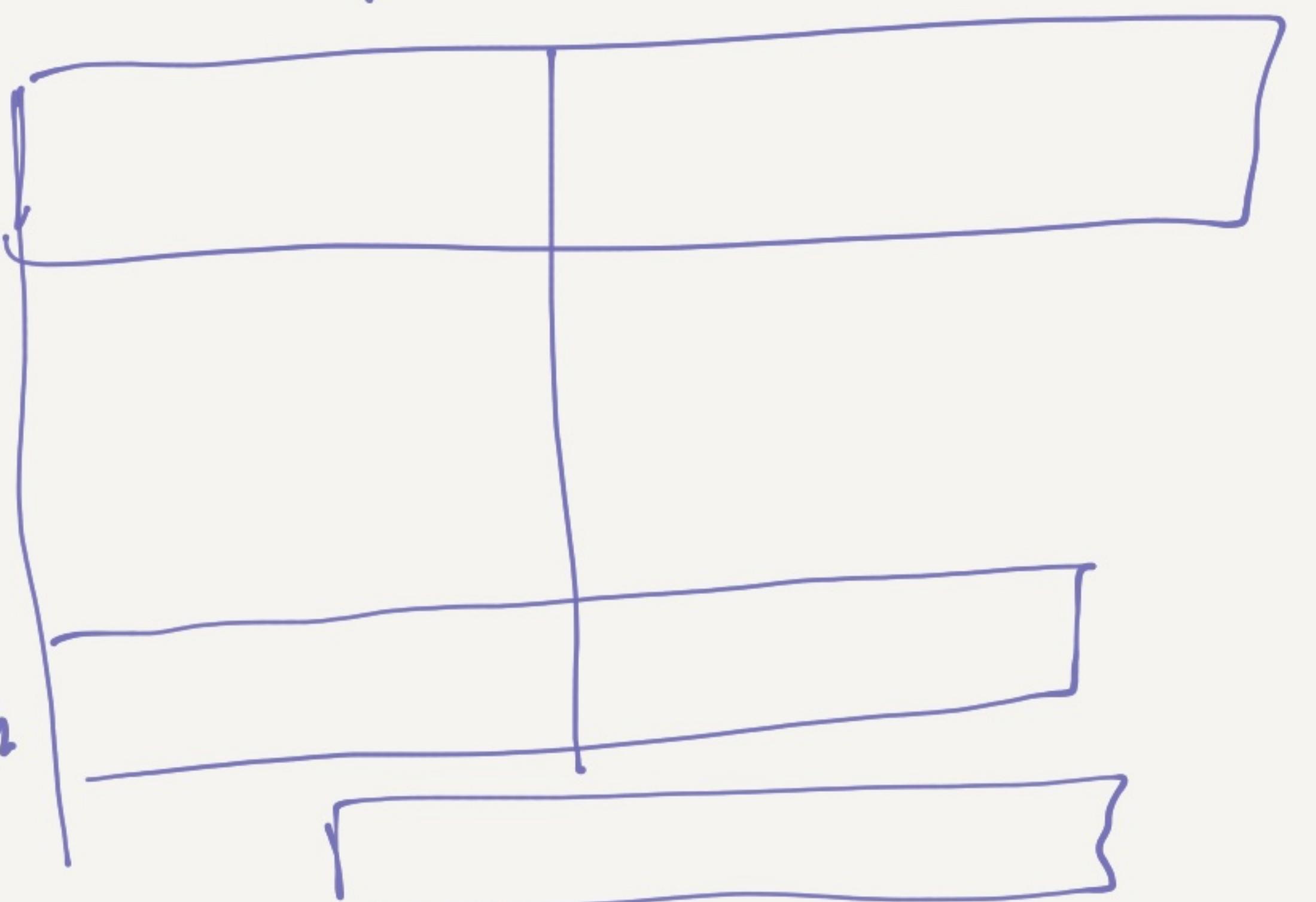


Text

...
- - - potat~~too~~
- - - ...

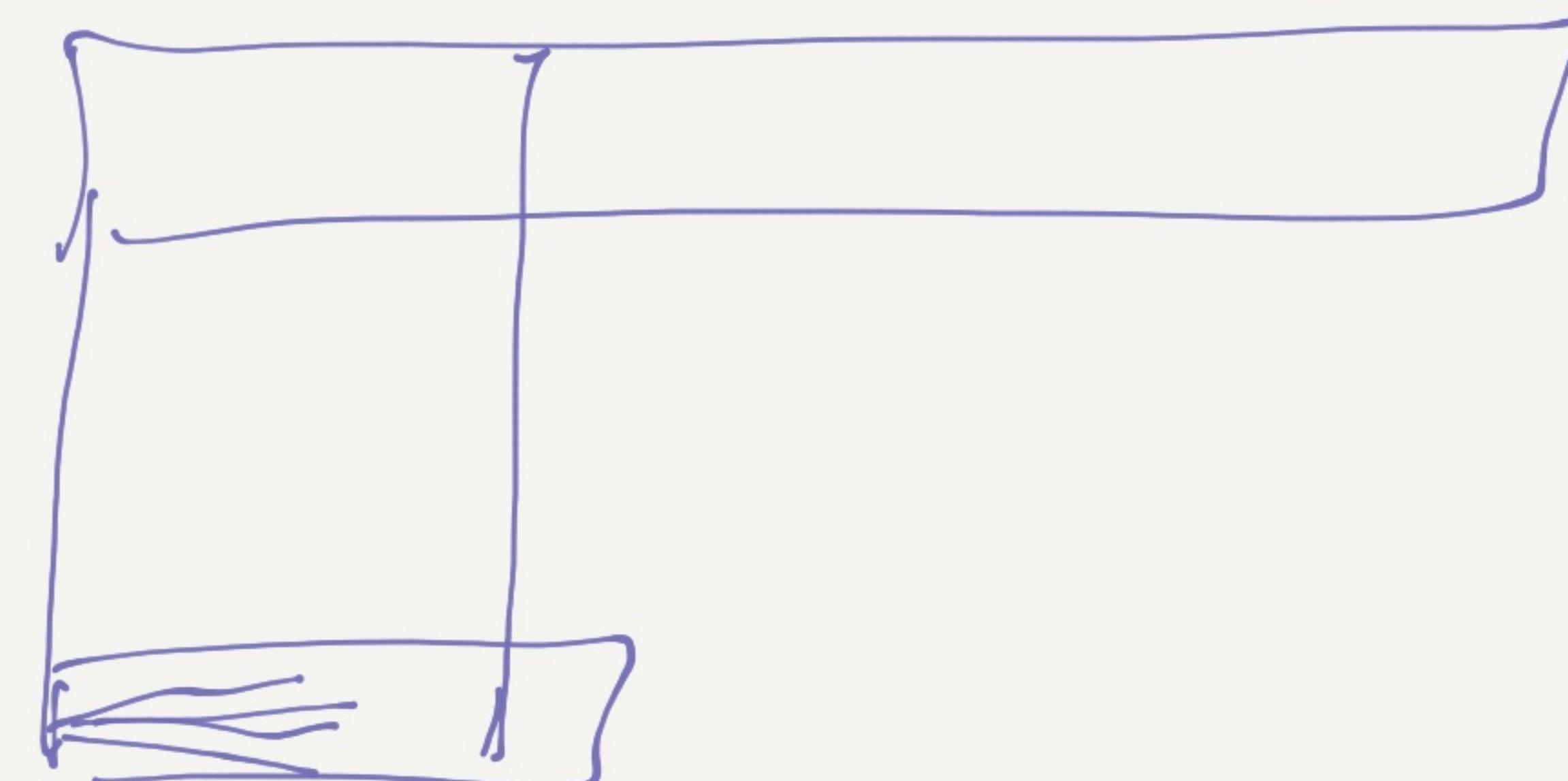
Text

Pattern



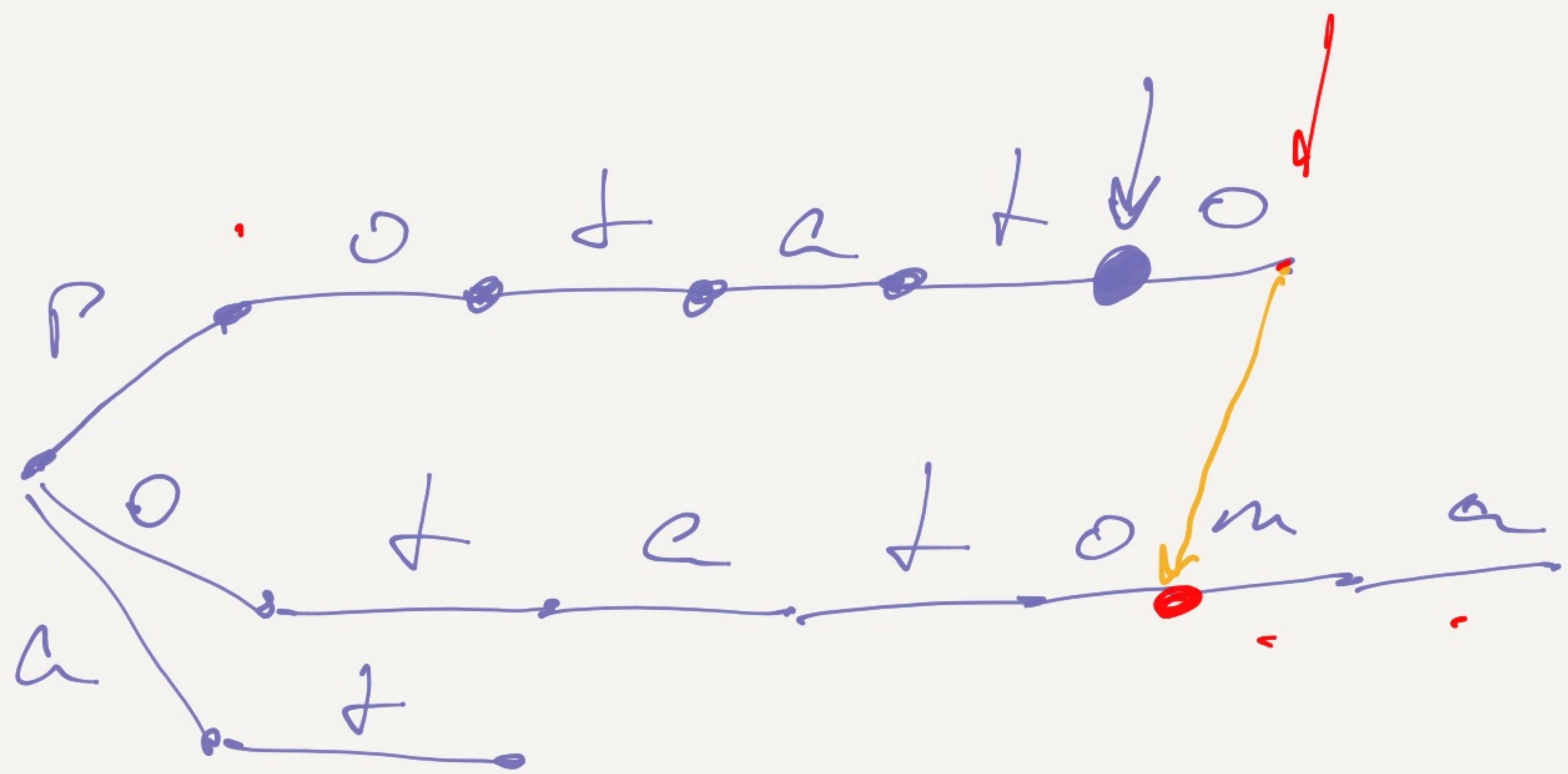
potat~~too~~

Text



potato
otatoma

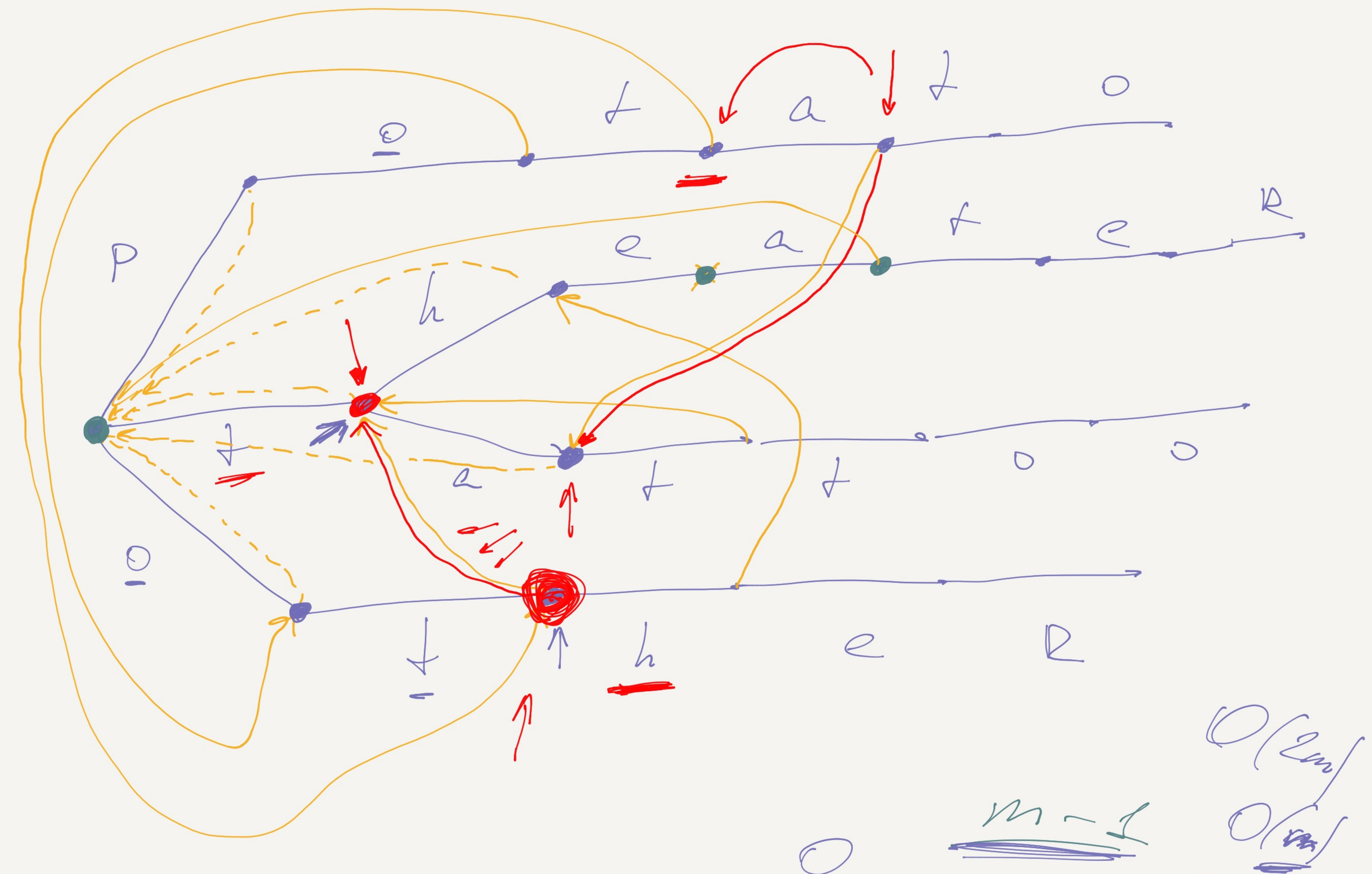
Potatoma 2

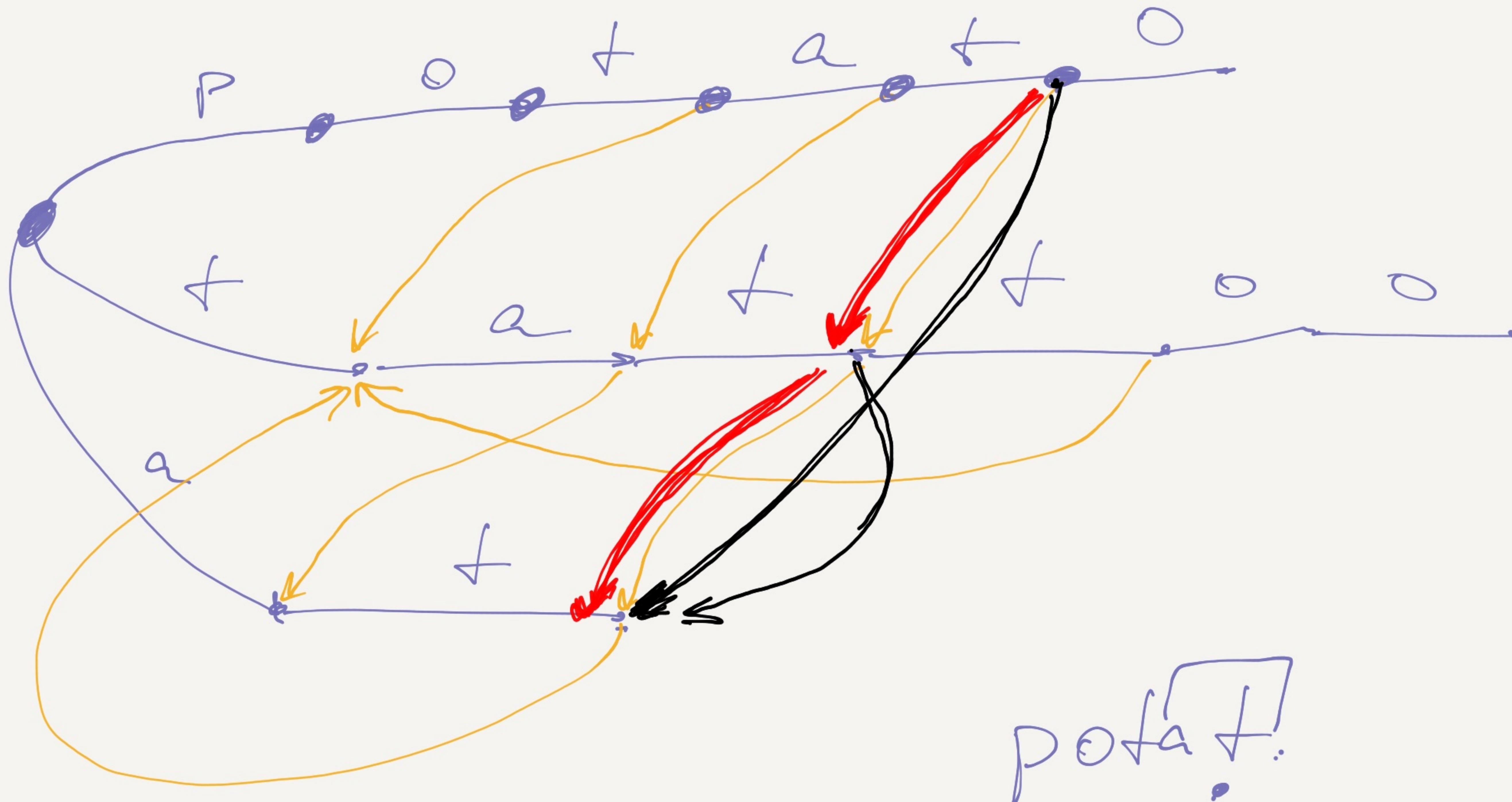


$P_1 = \text{Potato}$

$P_2 = \text{Otafoma}$

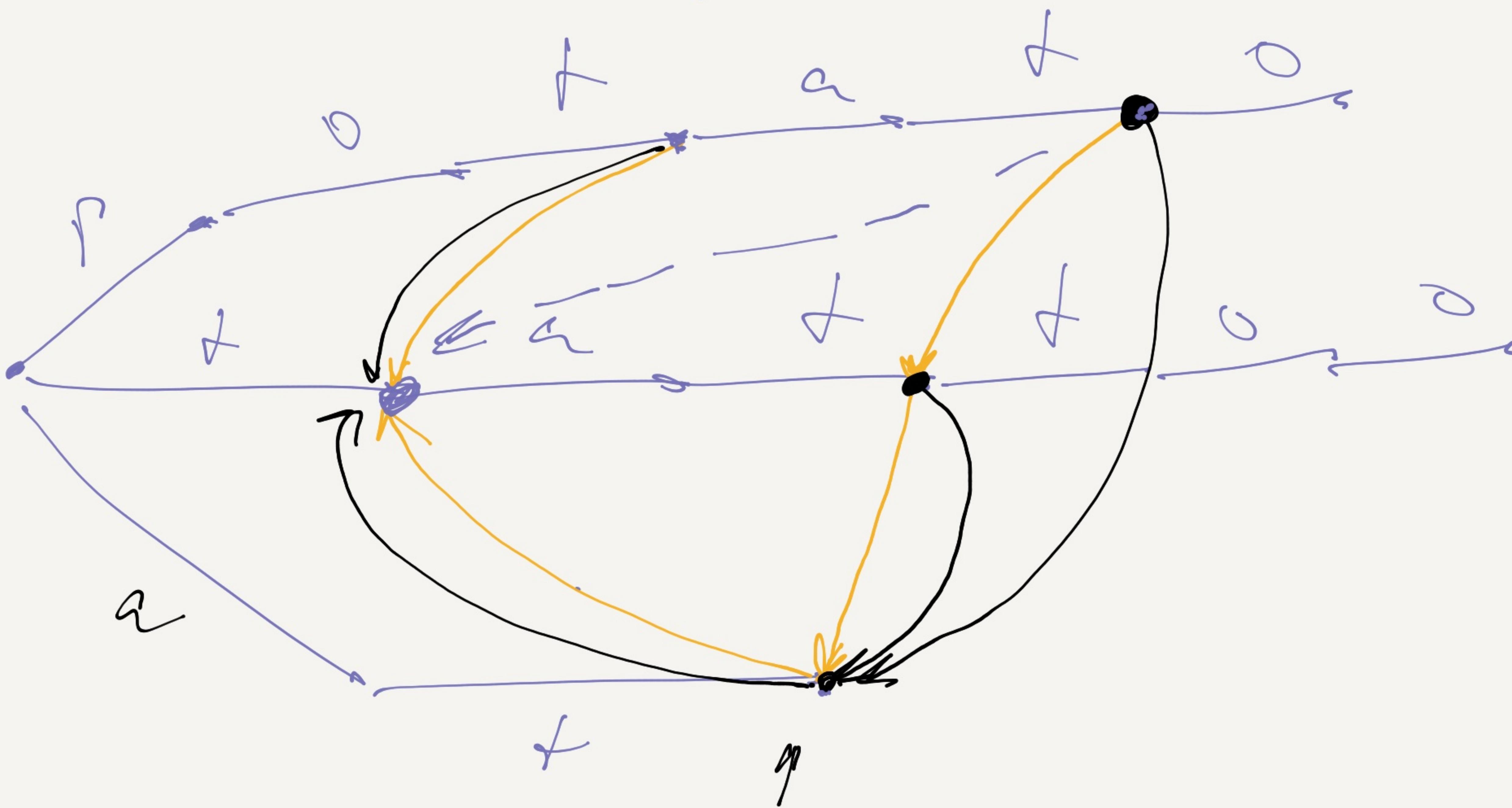
$P_3 = \text{at}$





Potato
tattoo
cut
t

Potat-
i i

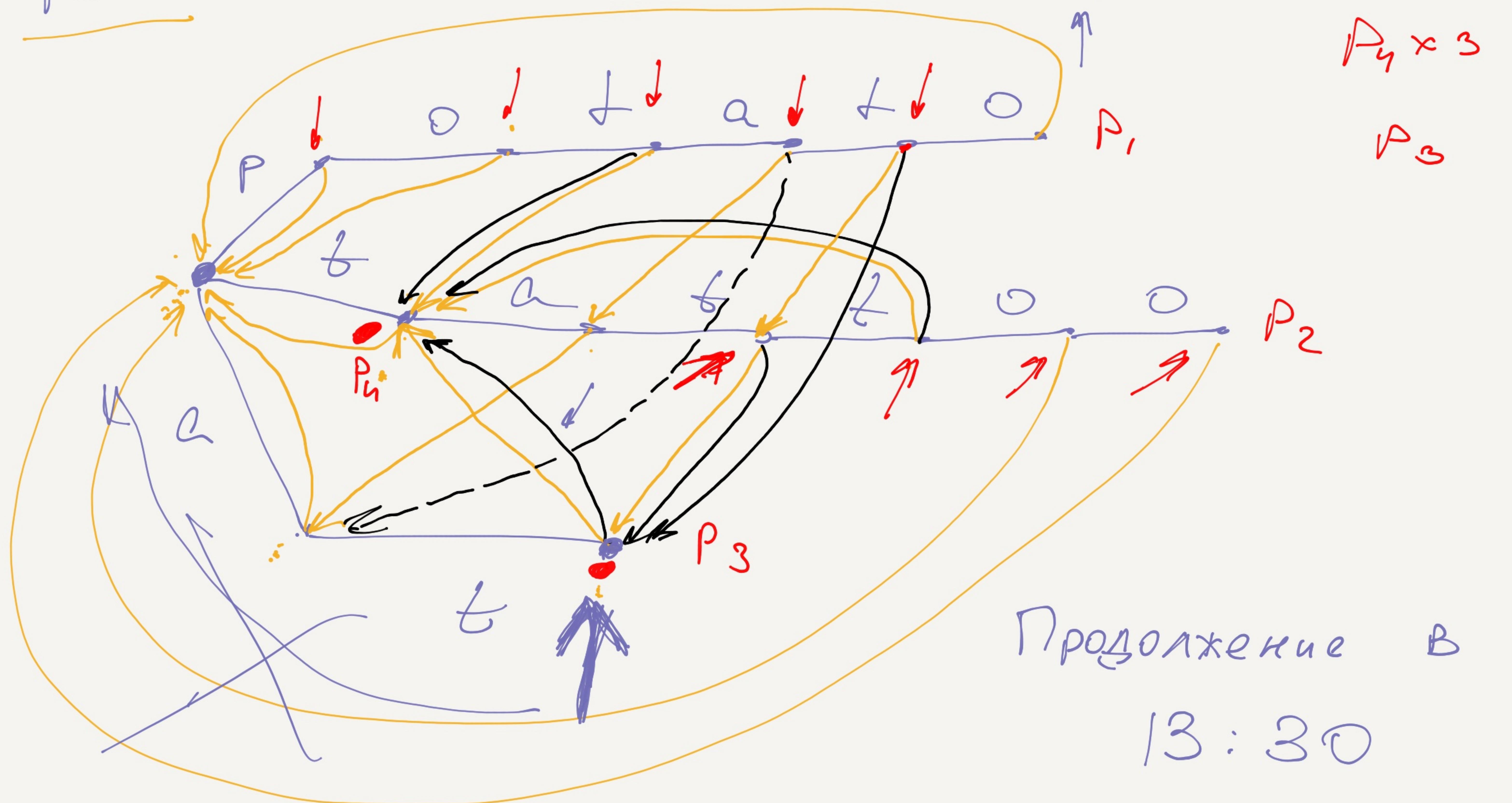


$P_1 = \text{Pofato}$

$P_2 = \text{fattoo}$

$P_3 = \text{at}$

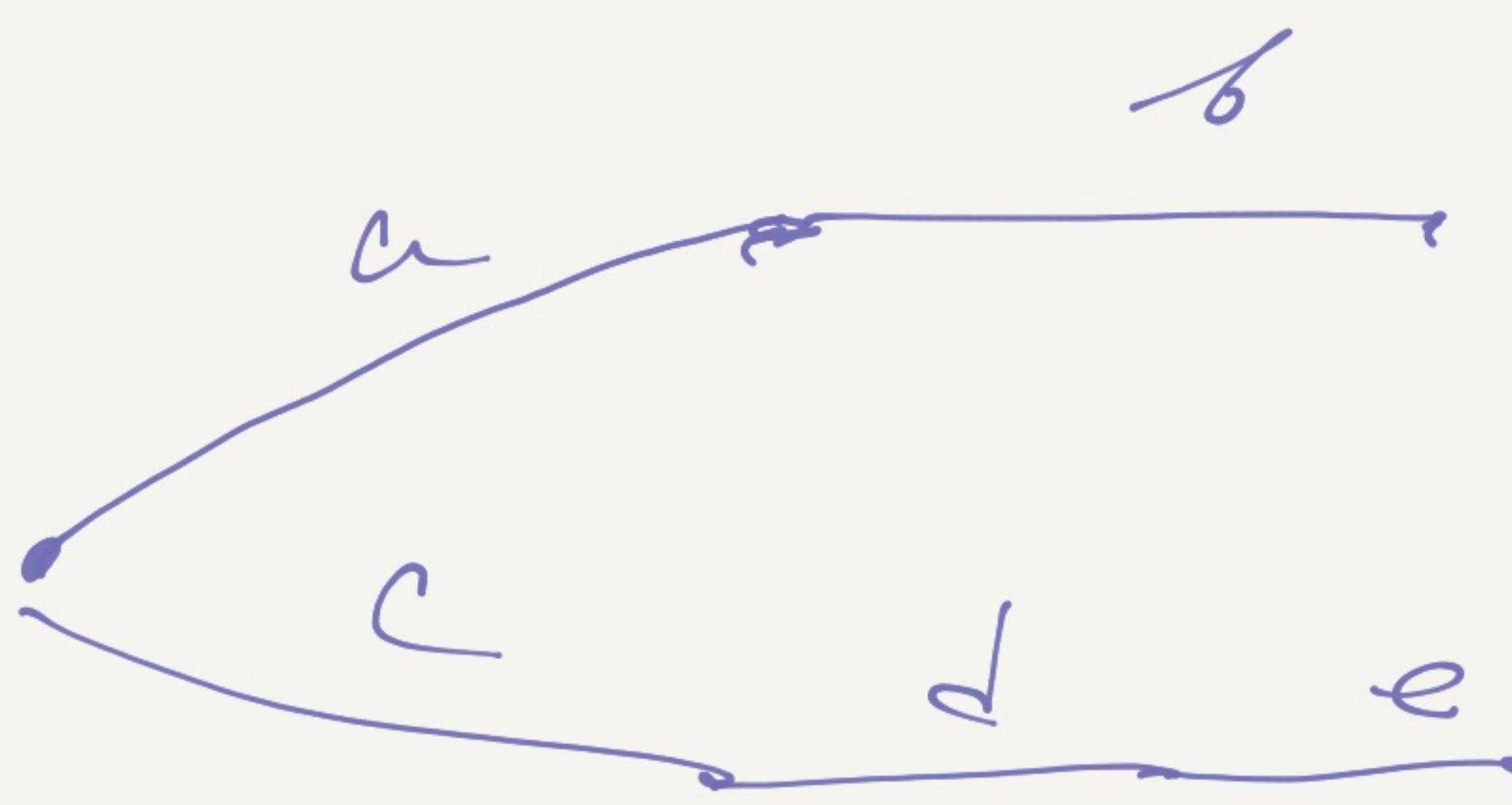
$P_n = +$



a b?cde ??ab

1 2 3 4 5 6 7 8 9 10

`split(pattern, "?")` → $\left[\begin{array}{l} ab, 1 \\ cde, 4 \\ aB, 9 \end{array} \right]$ Patterns
 $i \rightarrow P_k$



Tree

P_k, t

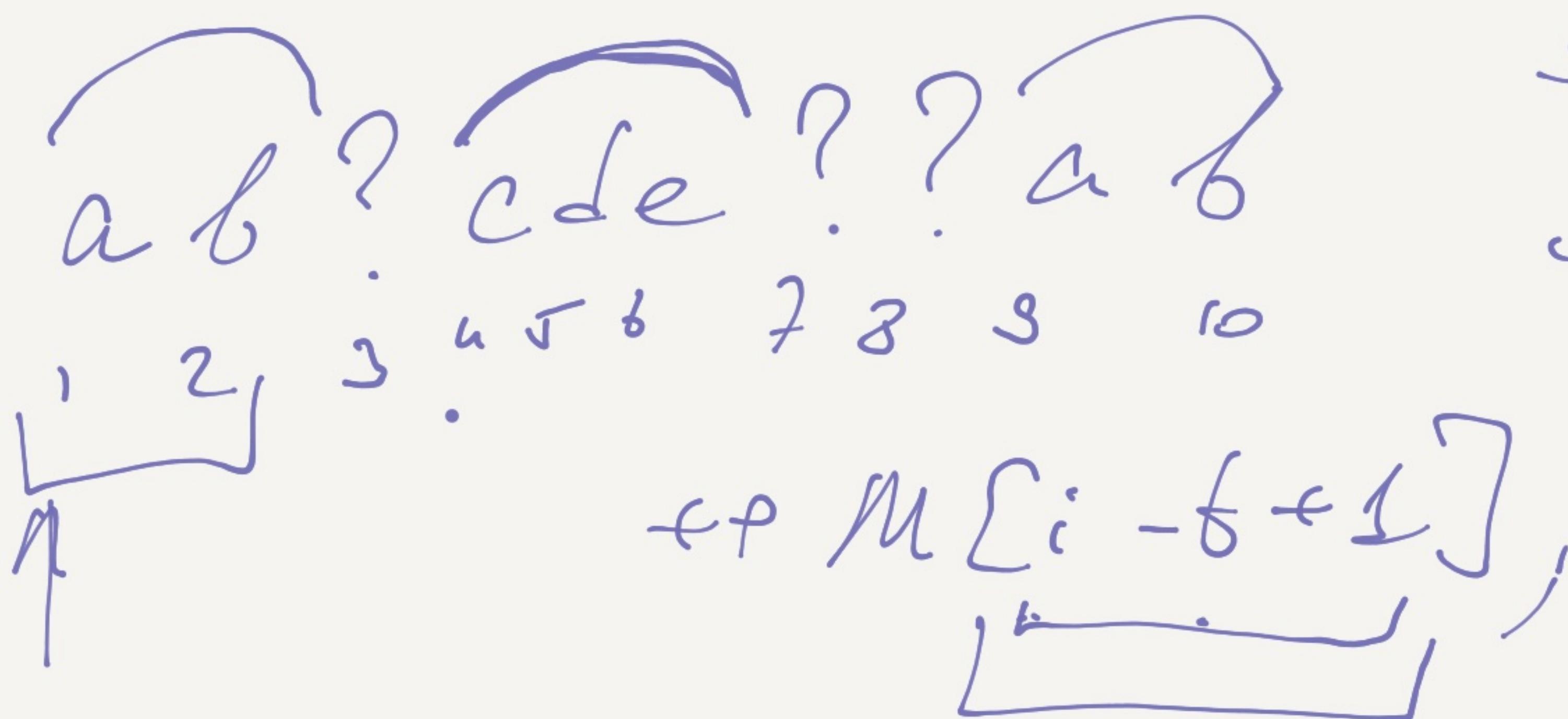
$M[i - t + 1 : i]$

Text

$M[i - t + 1 : i]$

M

$i - t + 1$ i



String ID,
Shift.

$$\begin{aligned} P_1 &= (ab, 1) \\ P_2 &= (cde, 4) \\ P_3 &= (ab, 8) \end{aligned}$$

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
indices	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
M_1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
M_2	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0

Diagram illustrating string matching. The string M is shown as:

$$M = \text{a} \underset{1}{\text{b}} \underset{2}{?} \underset{3}{\text{c}} \underset{4}{\text{d}} \underset{5}{\text{e}} \underset{6}{?} \underset{7}{?} \underset{8}{\text{a}} \underset{9}{\text{b}}$$

The window $M[i:f+1]$ is highlighted with indices from 1 to 15. The pattern P_1 is $(ab, 1)$, P_2 is $(cde, 4)$, and P_3 is $(ab, 8)$.

1 - 1 + 1.

1 - 3 + 1

3 - 4 + 1

6 - 1 + 1

6 - 5 + 1

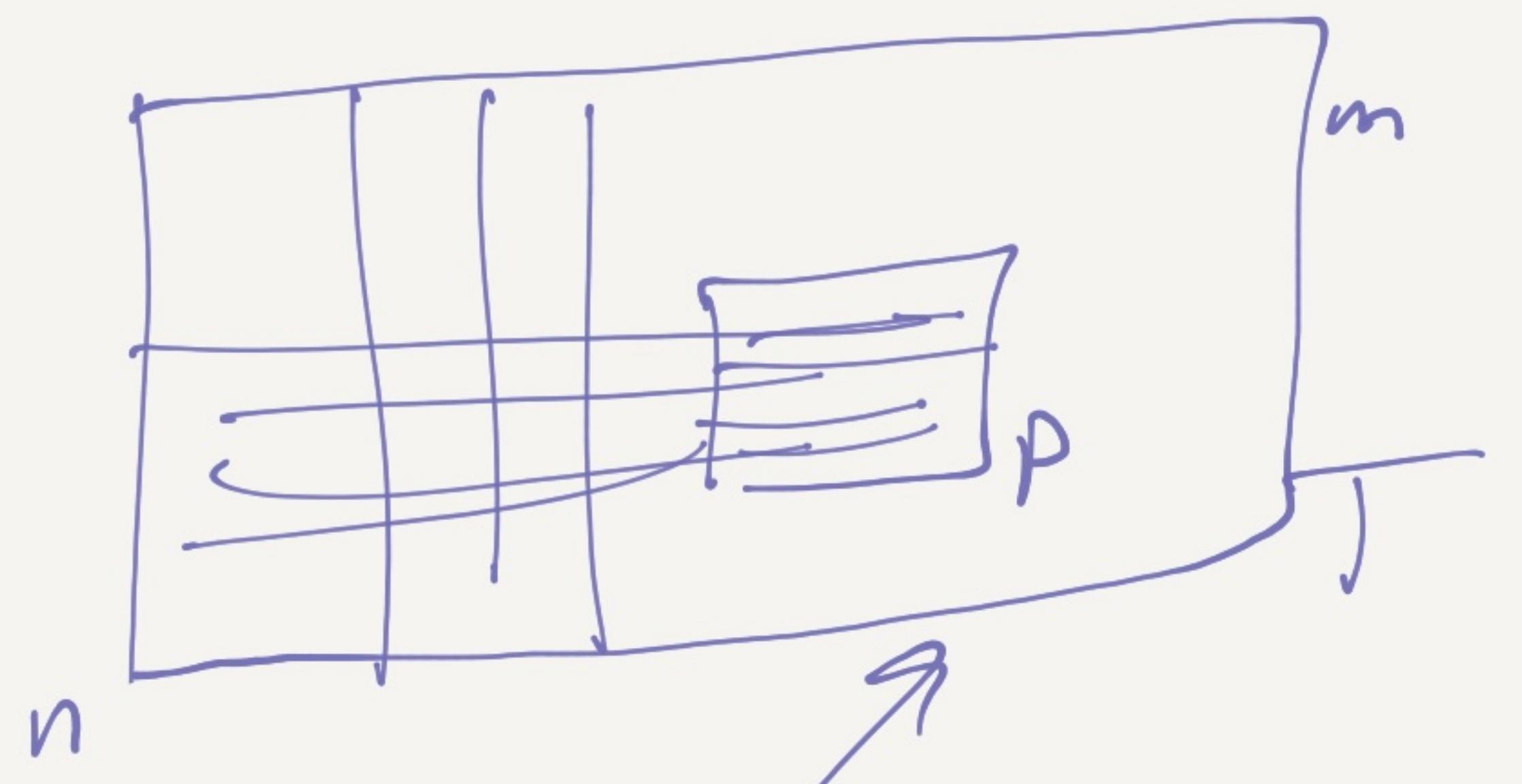
9 - 4 + 1

12 - 1 + 1

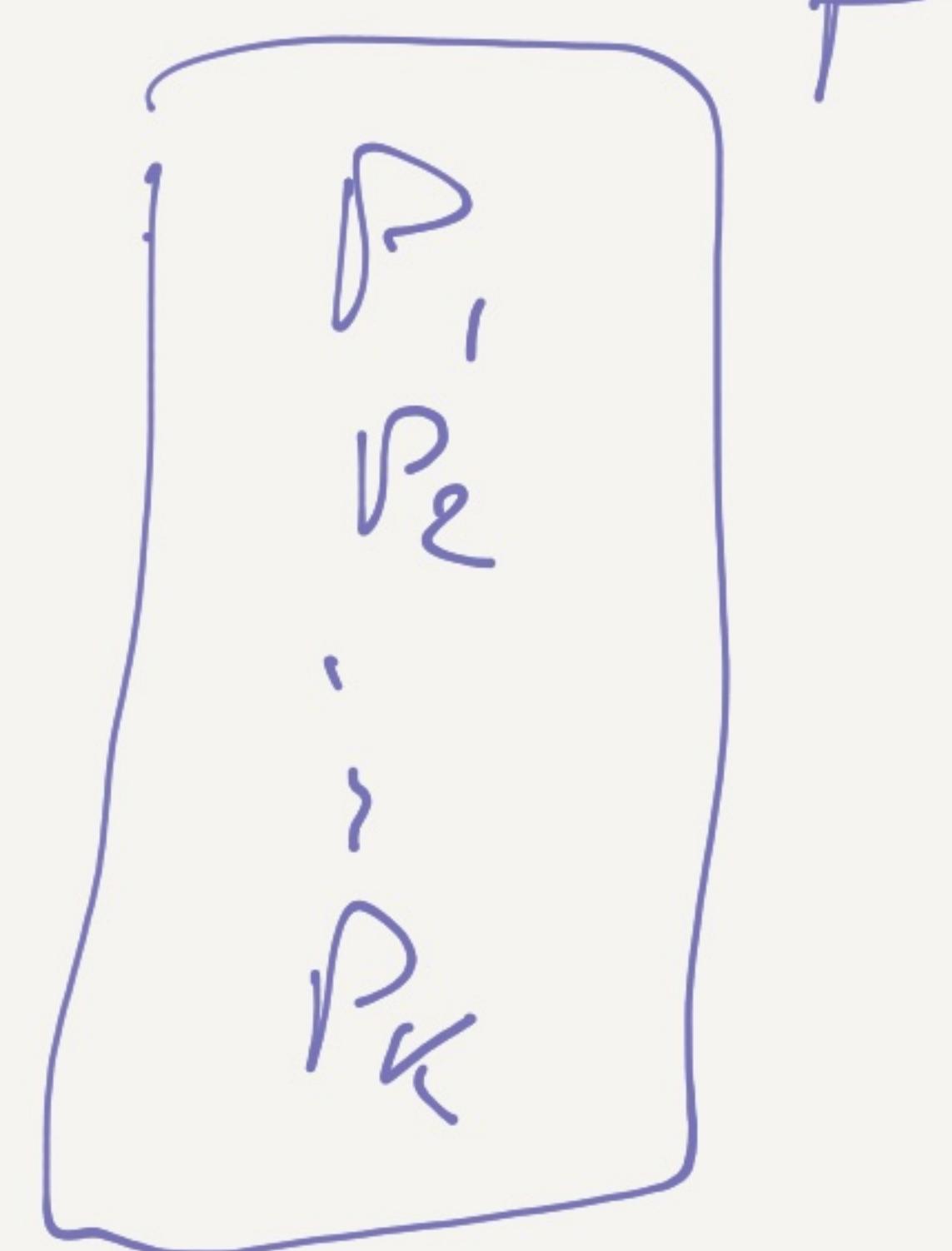
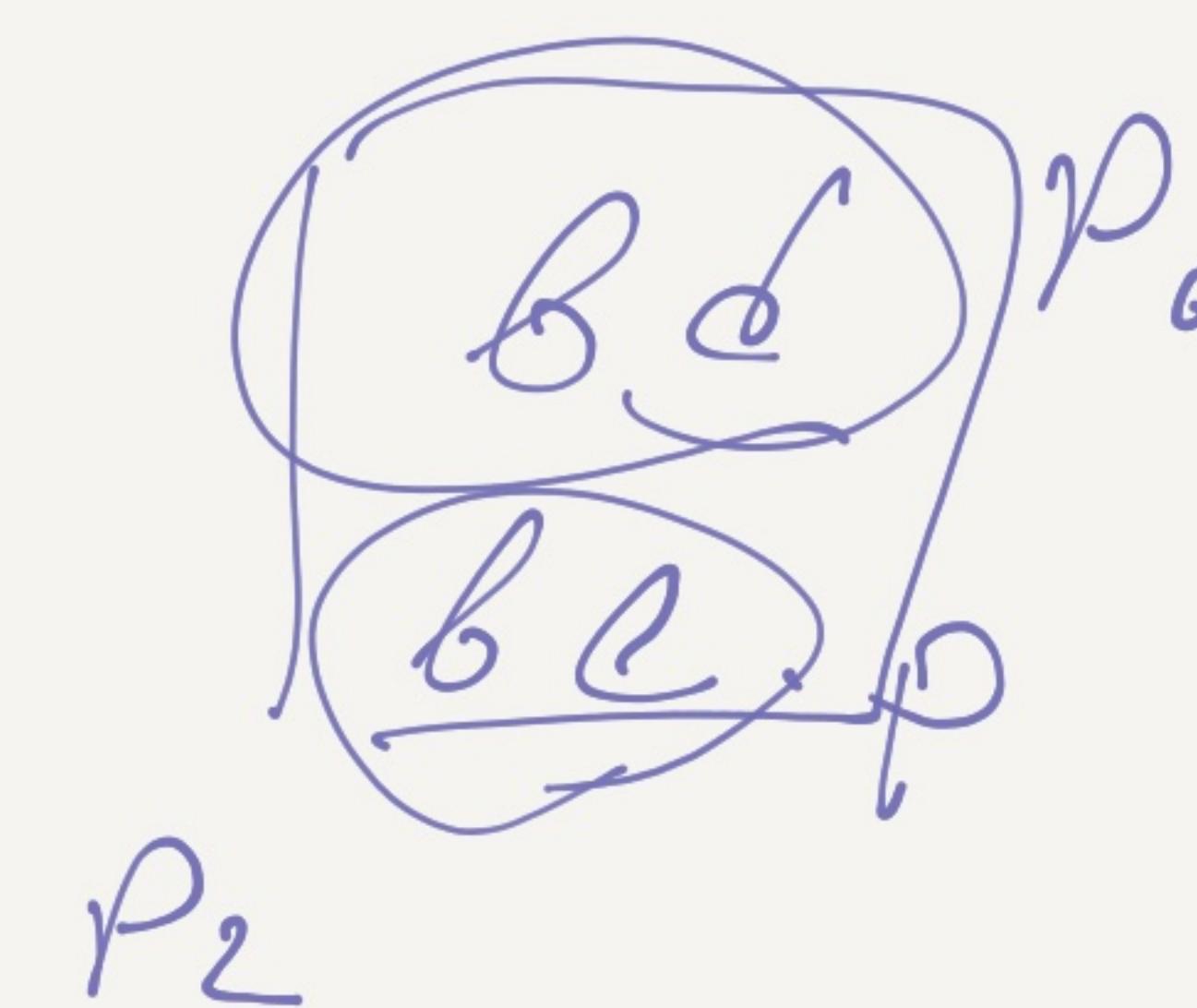
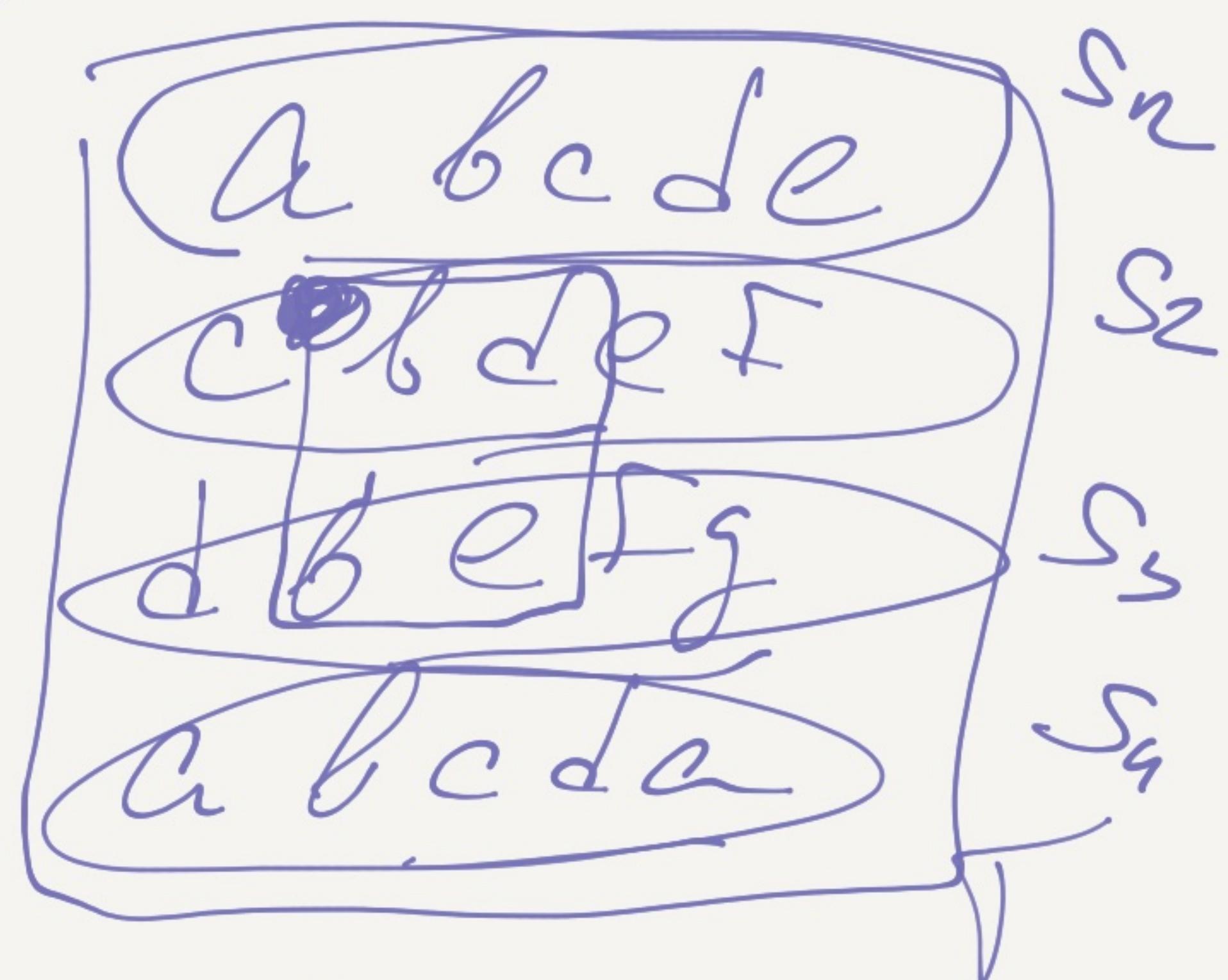
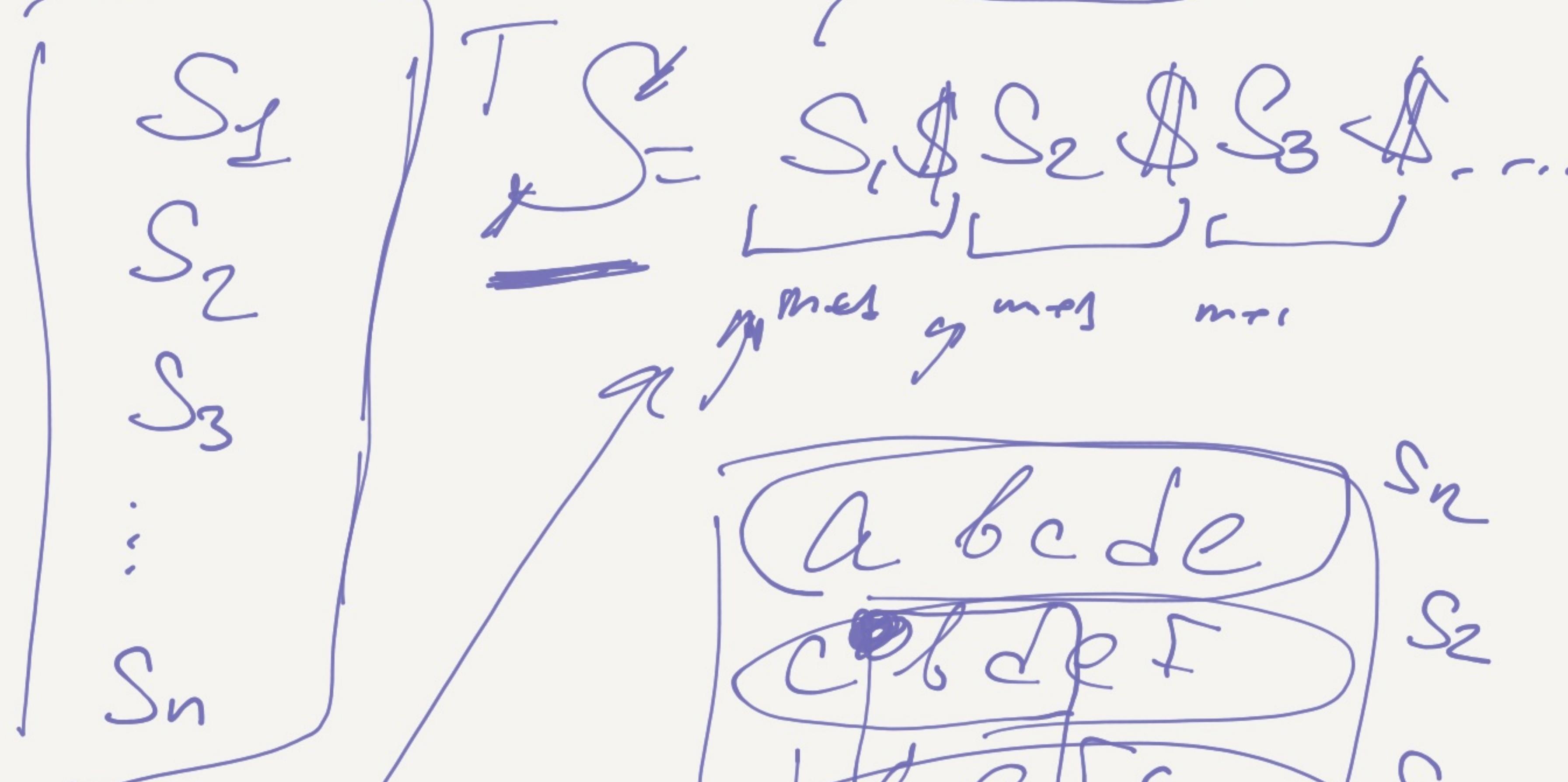
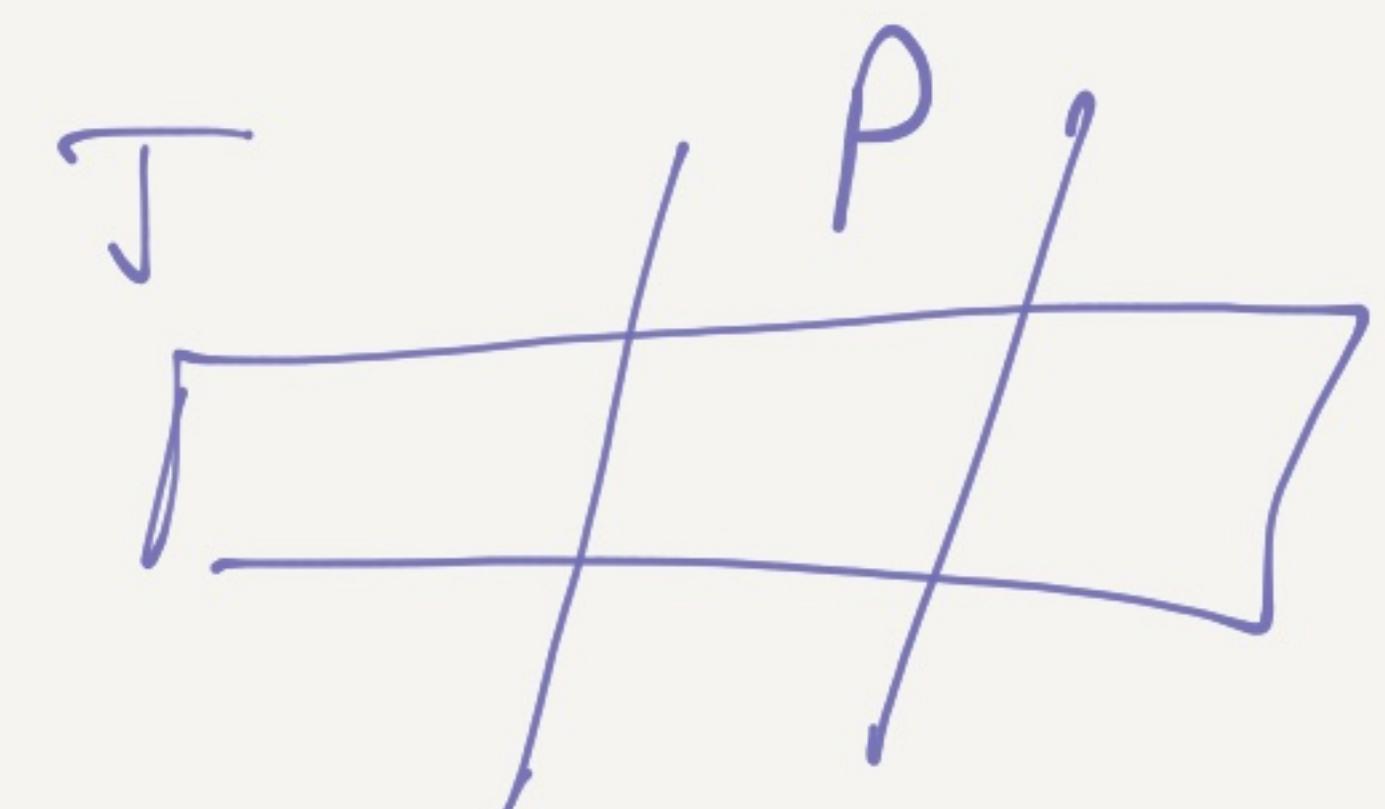
12 - 9 + 1

14 - 1 + 1

14 - 9 + 1

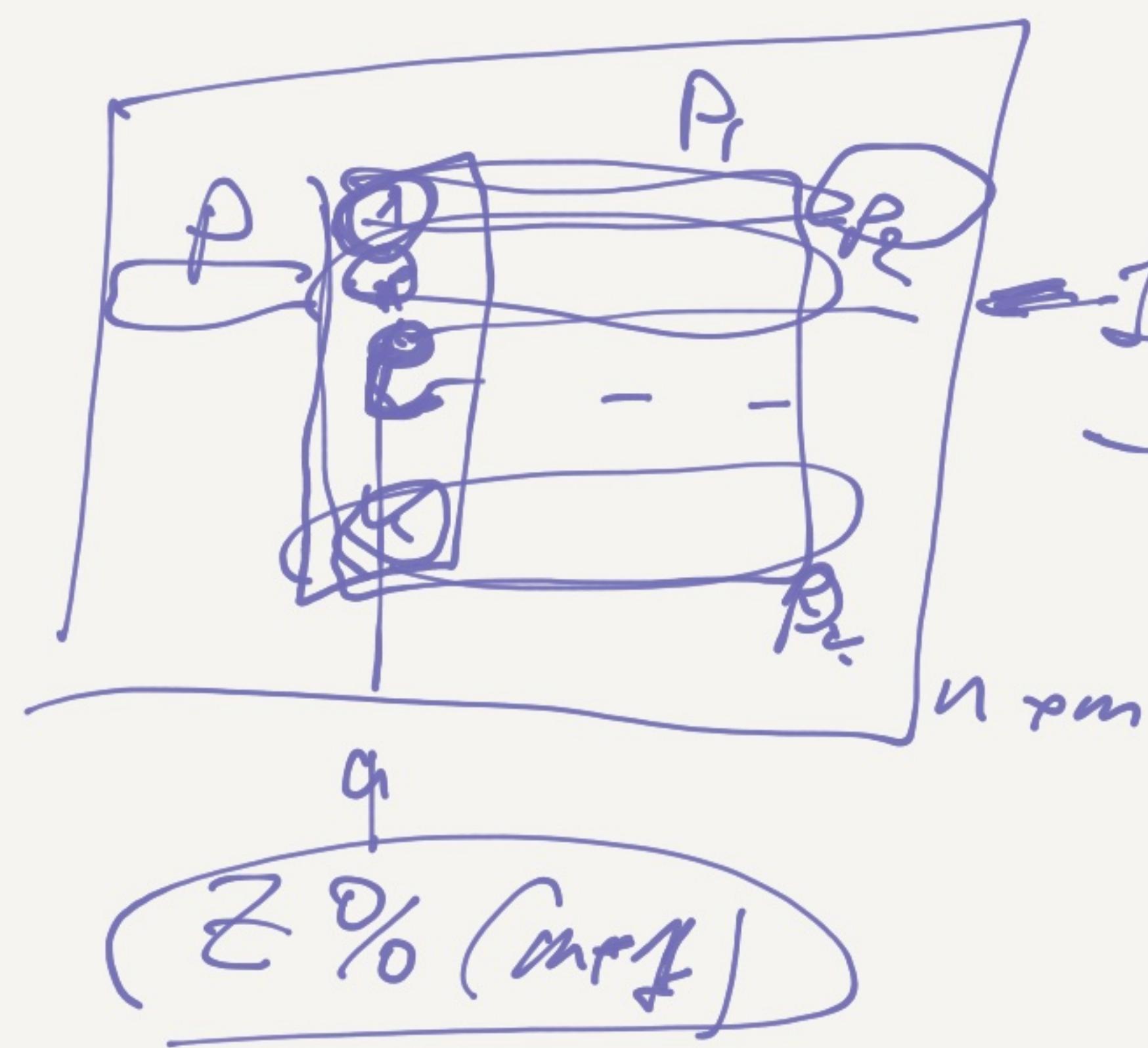


$$T = n \times m$$



Trie : P_1, P_2, \dots, P_k

$$\begin{matrix} 1 \times l \\ 2 \times 2 \end{matrix}$$

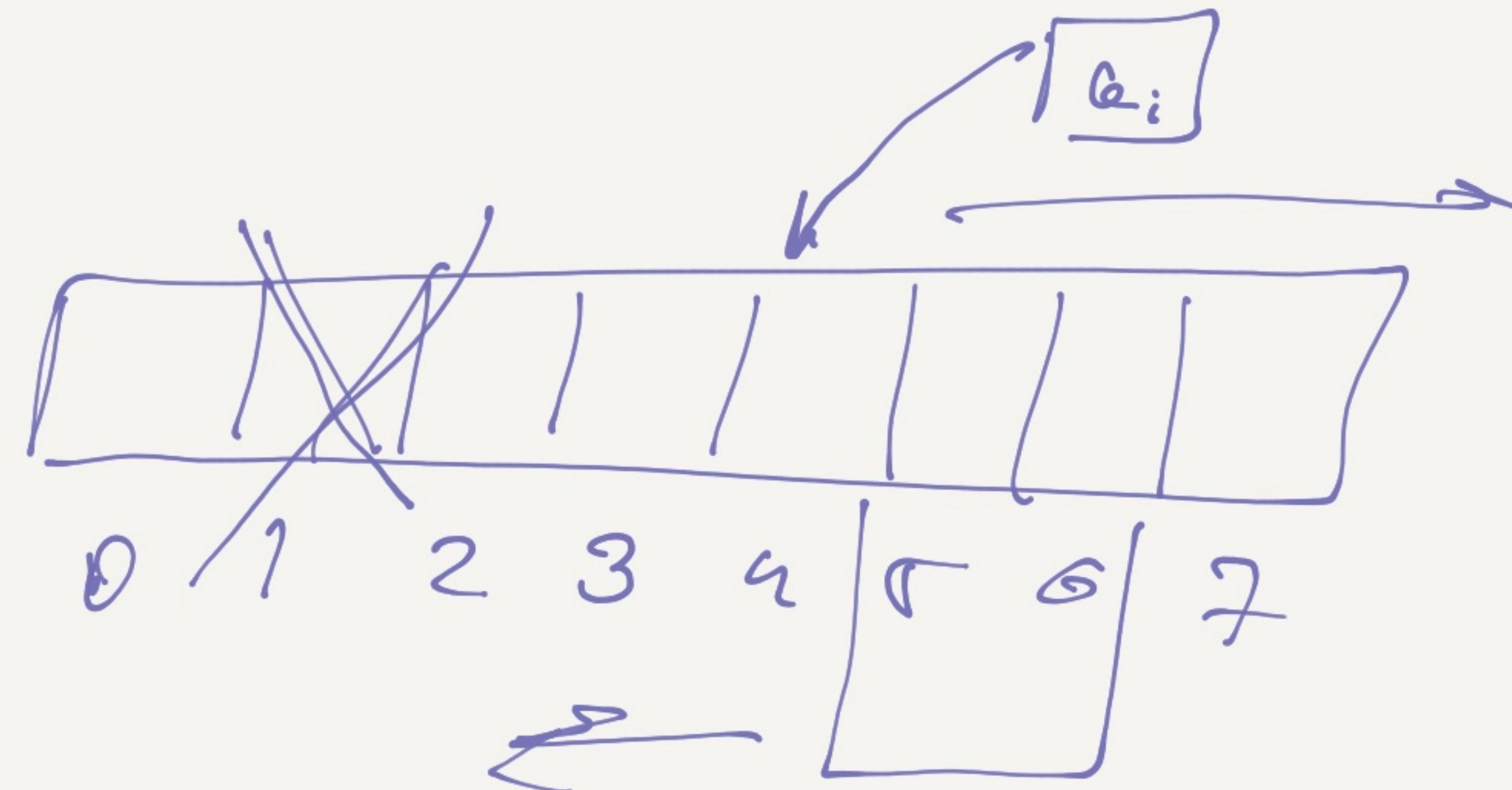


$$\frac{P_i}{T} = \underline{\underline{z}} = \underline{\underline{2/(m+1)}}$$

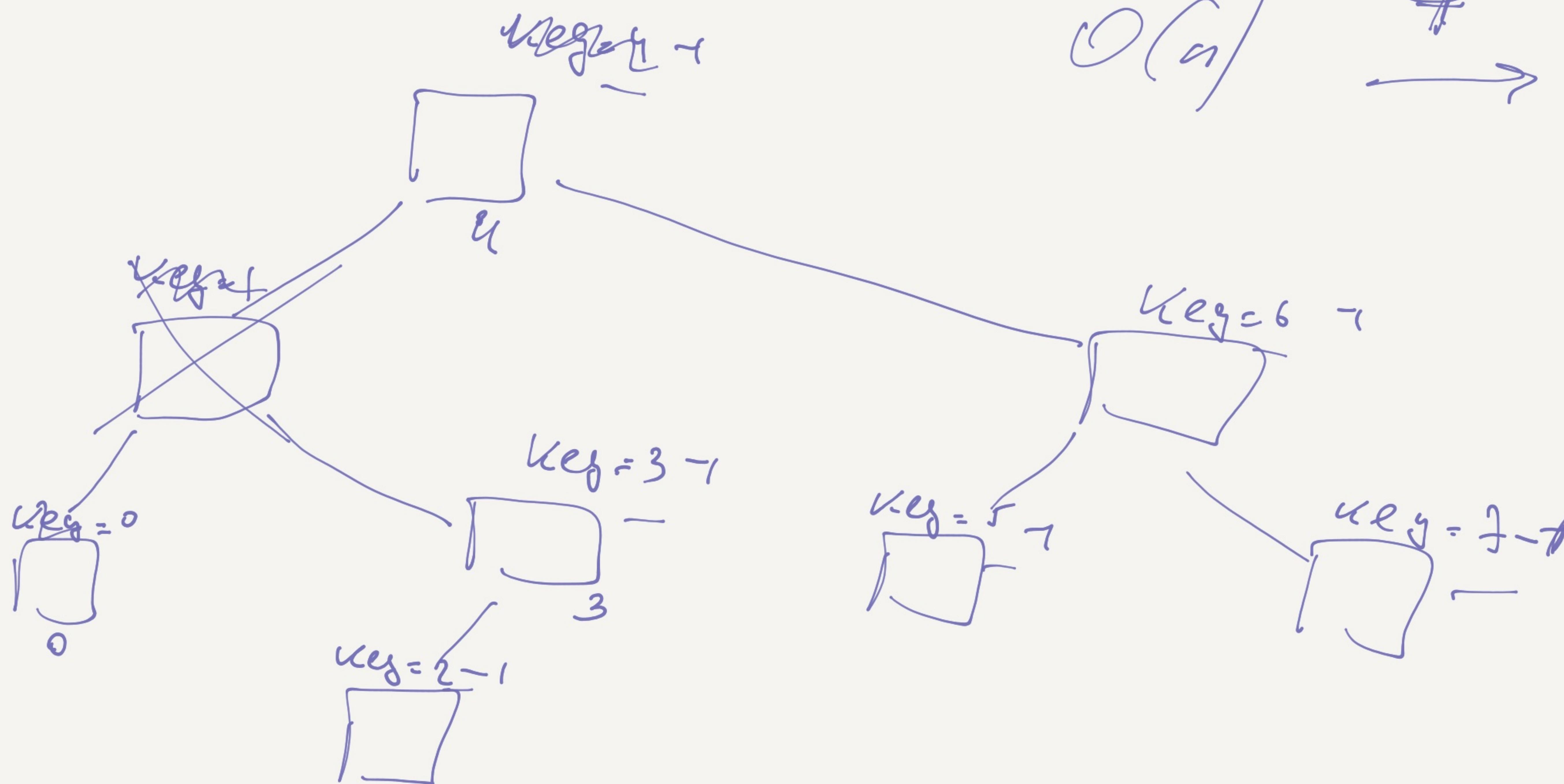
$\langle \text{key, priority} \rangle$

key \rightarrow BST

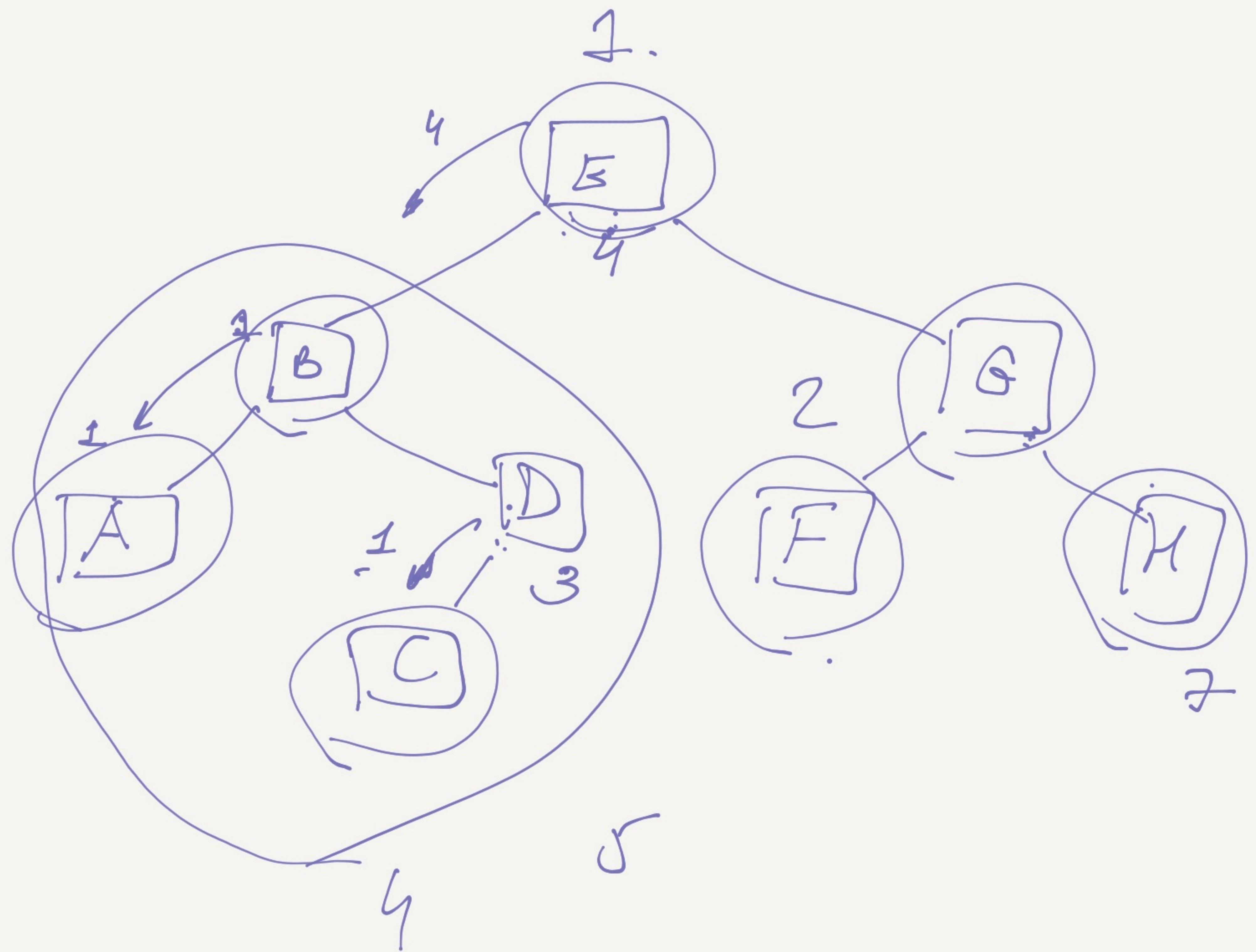
priority \rightarrow heap

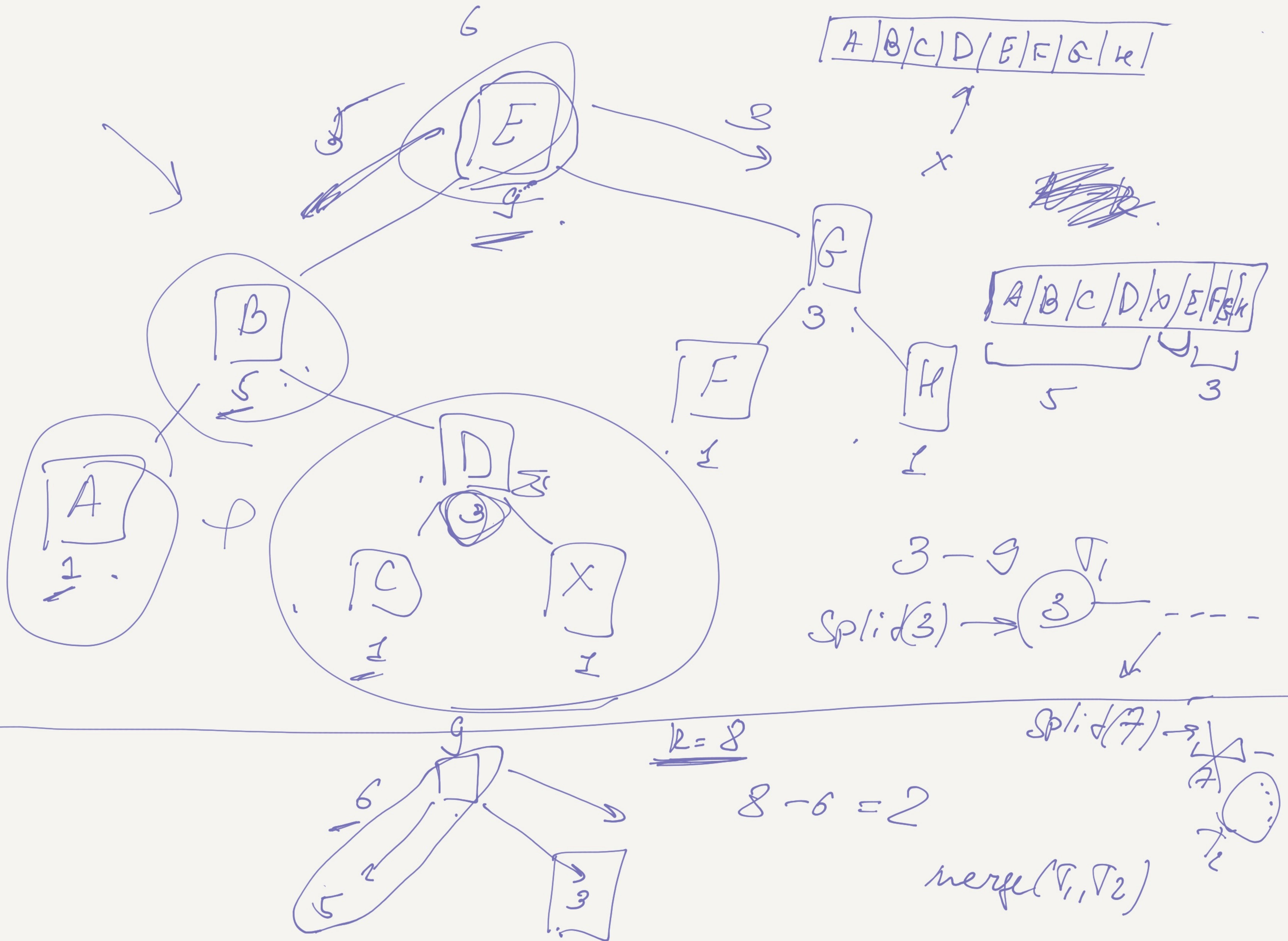


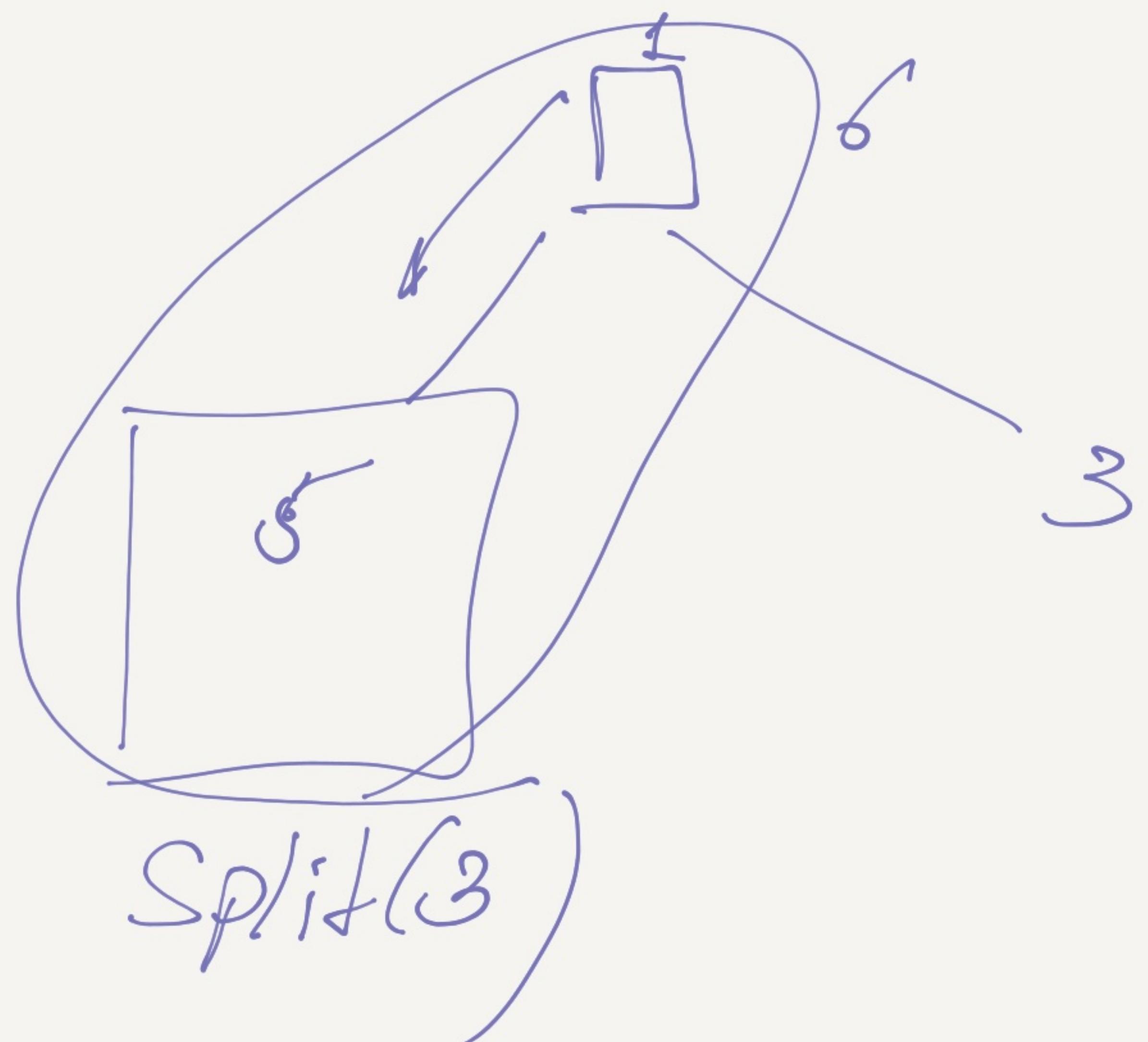
$O(a)$ ↗



A	B	C	D	E	F	G	H
0	1	2	3	4	5	6	7







Split(3)

Split(x)

$\text{left} = \text{root} = y$

$x < y \rightarrow \text{split}(x; \text{left})$

$x > y \rightarrow \text{split}(x-y, \text{right})$

