Probability

1/3

Monty Hall Problem

NP

NS

2/3

S

Game Show

Must

1

1/2

1/2

NS

1

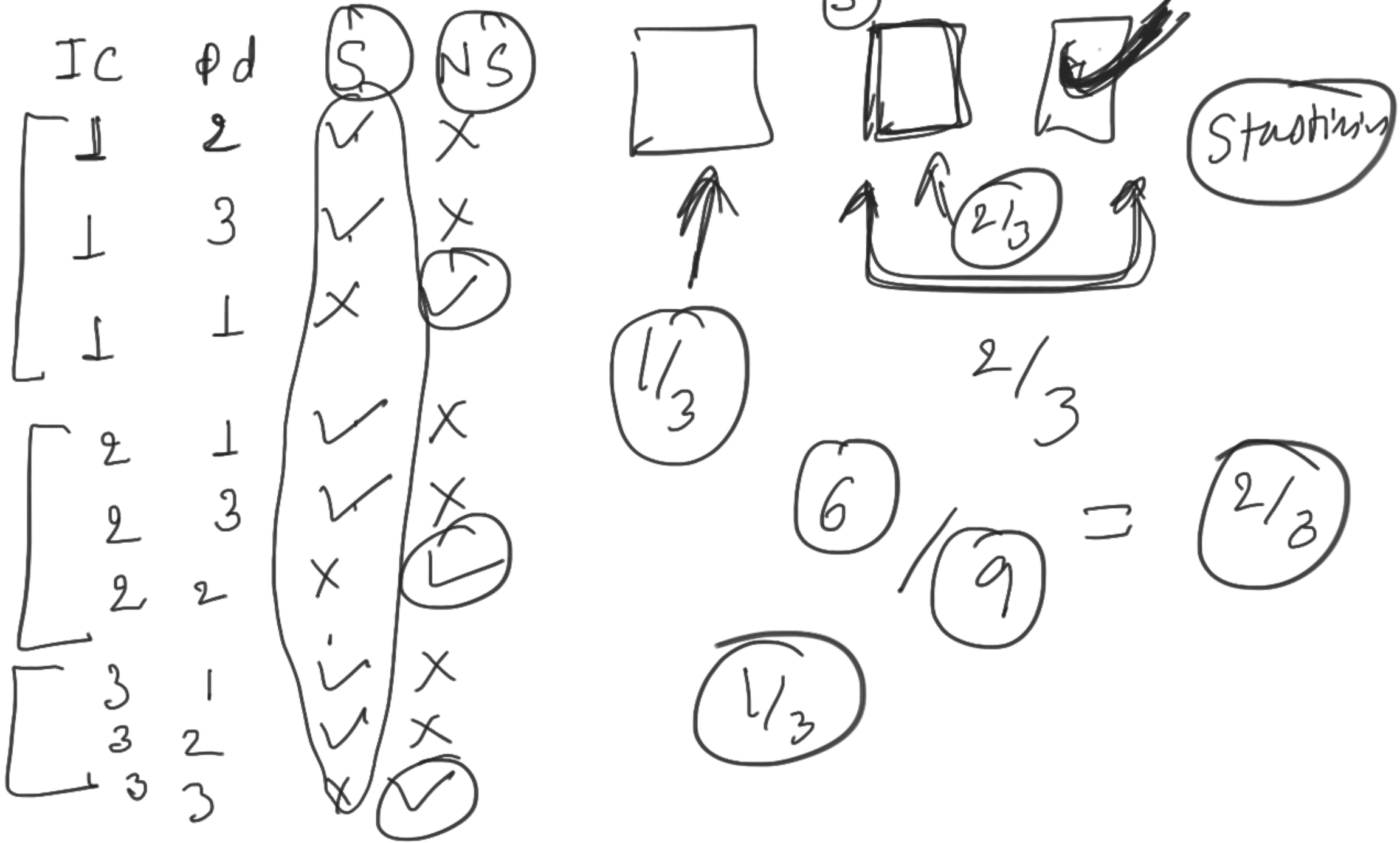
2

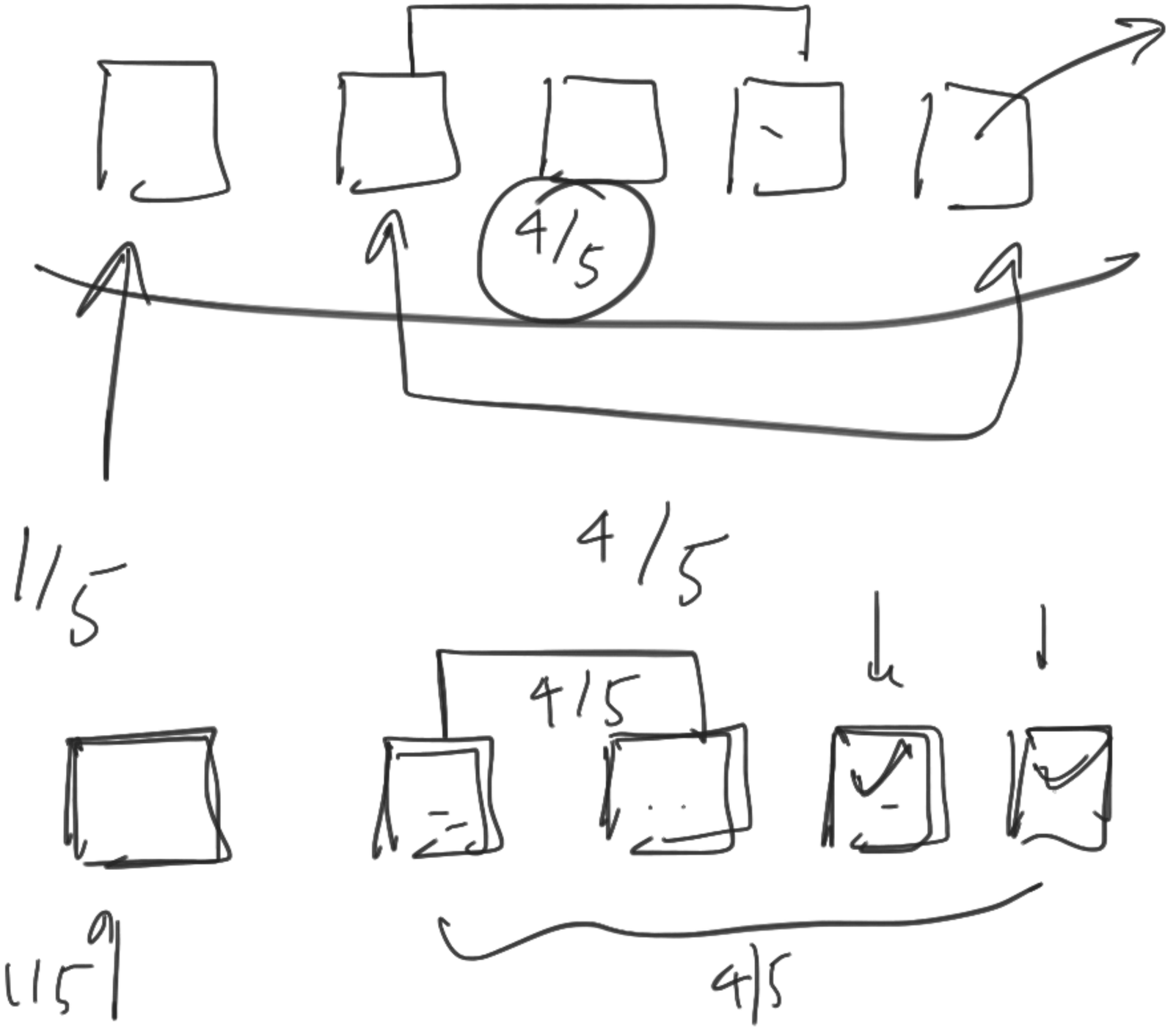
3

2 → No Prize

+ Prize

closed


Ic
ϕd
S
NS
2
3
1
1
2
1
2
3
2
2
3
1
3
2
3
3
1/3
S
2/3
Stratifying
2/3
6/9
=
2/3
1/3


4/5
1/5
4/5
4/5
1/5
4/5

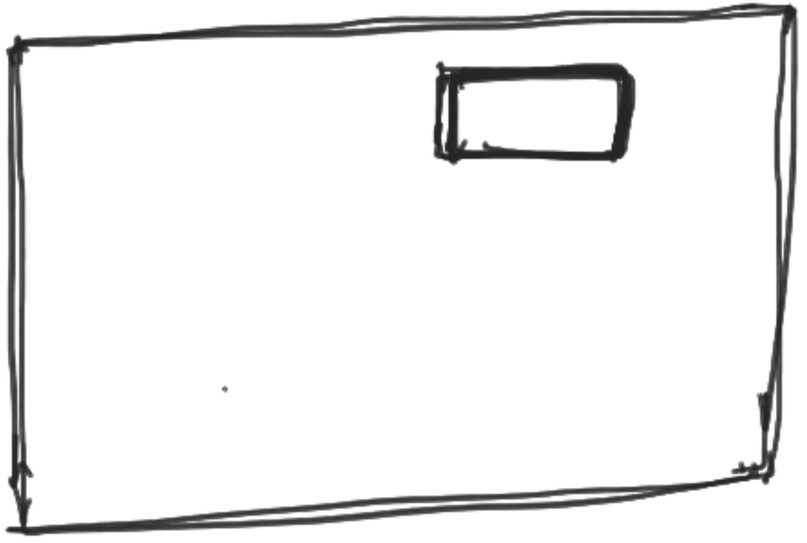
Microsoft Puzzle

Brain Teaser

5 clues

Algorithmic Puzzle

Oxford

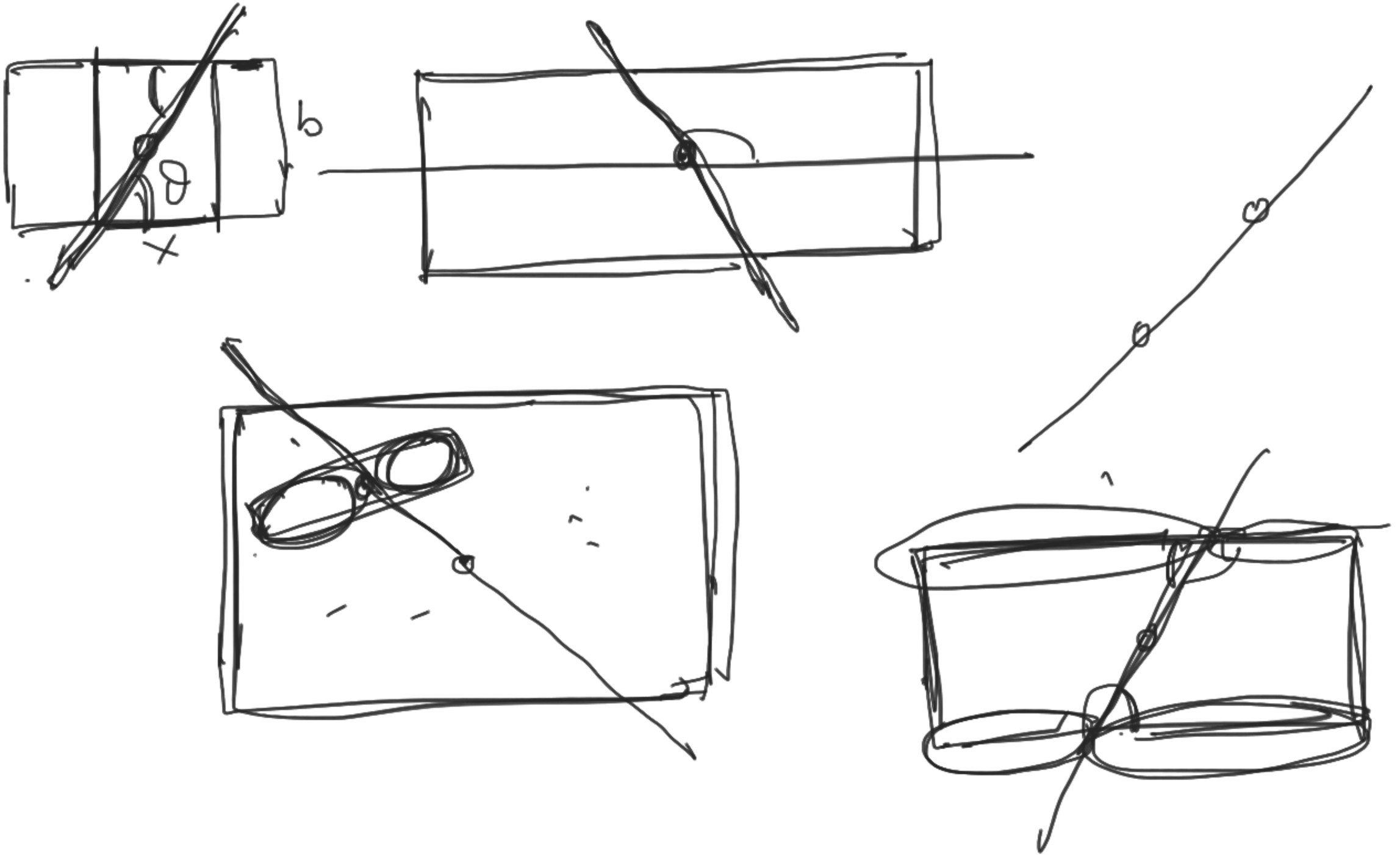


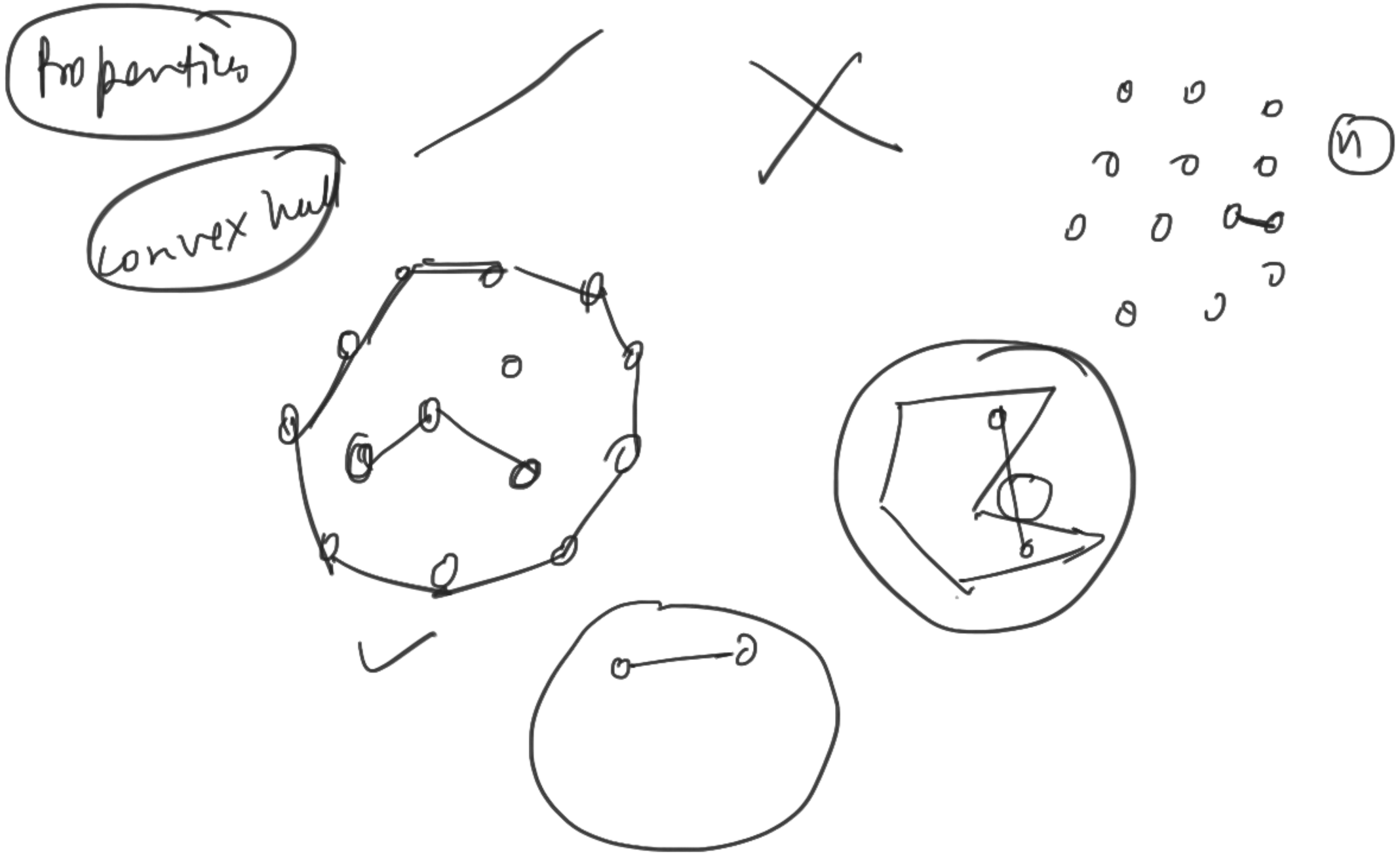
two equal pieces

Knife

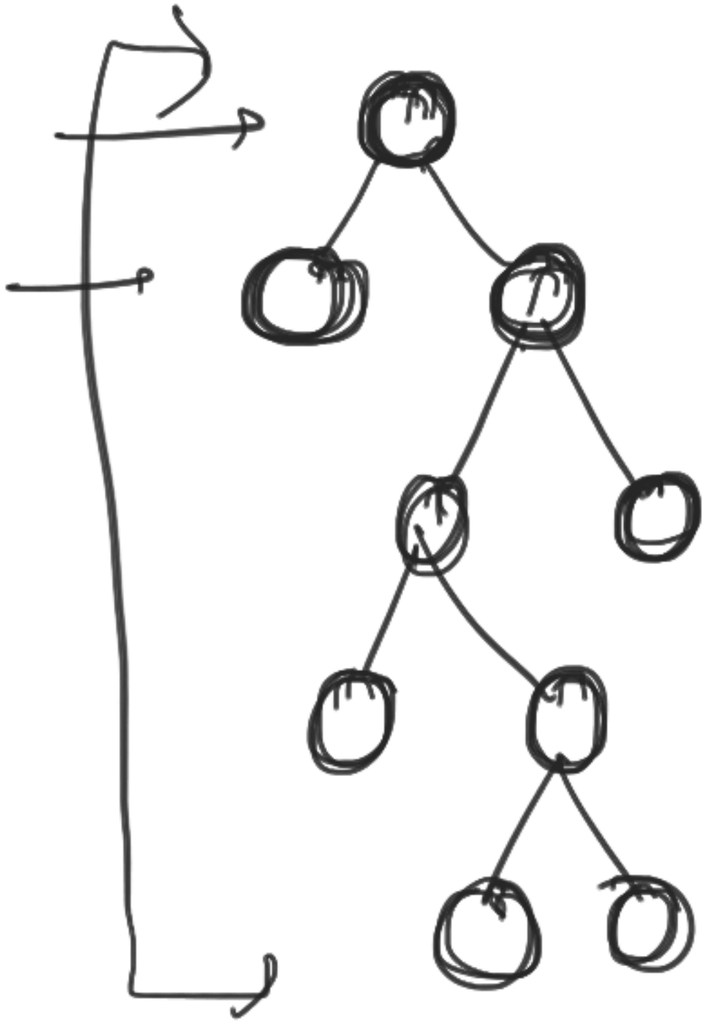
Rectangular cake.

one single cut (vertical)


b
θ
x


Properties
Convex hull
n

Strict binary tree



$\Rightarrow I = L - 1$

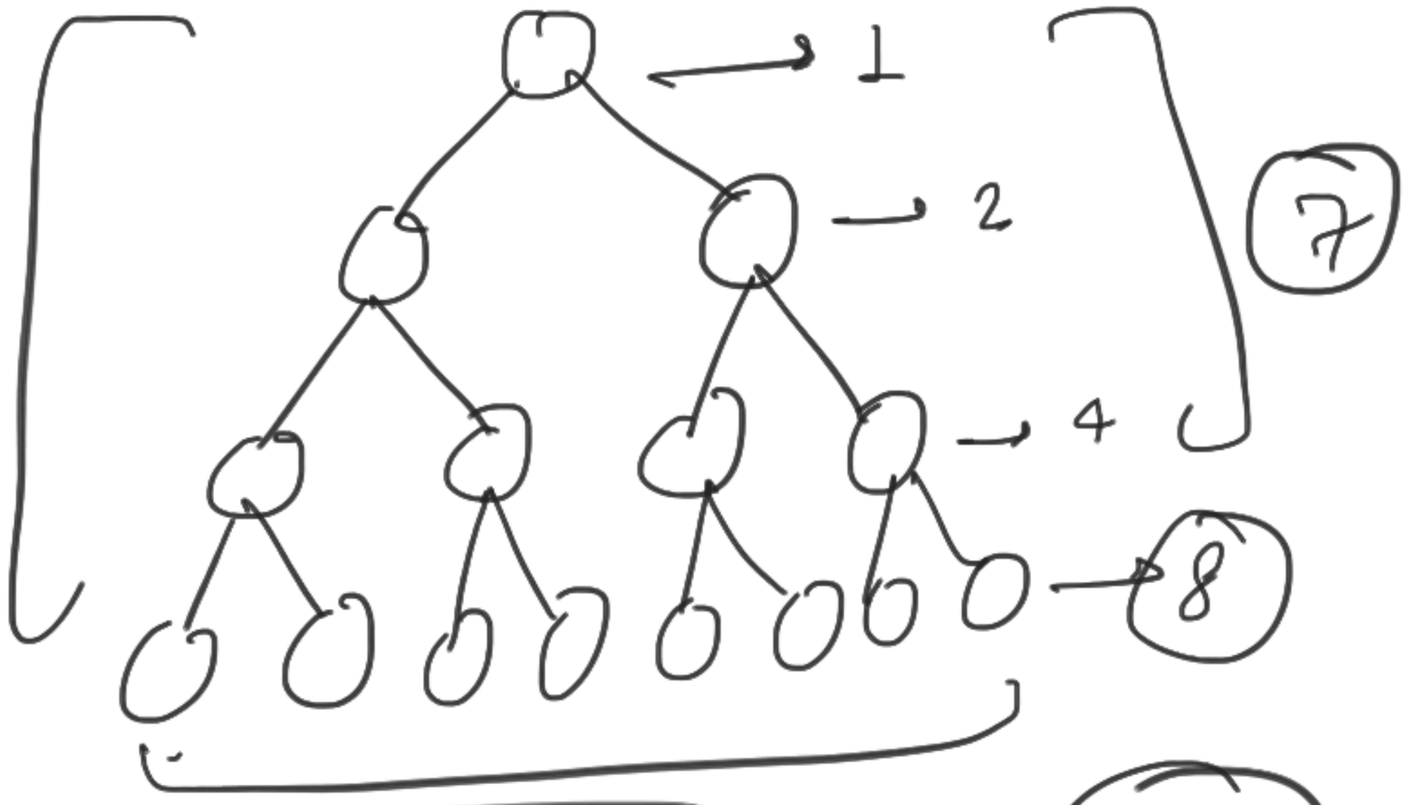
$\Rightarrow L = I + 1$

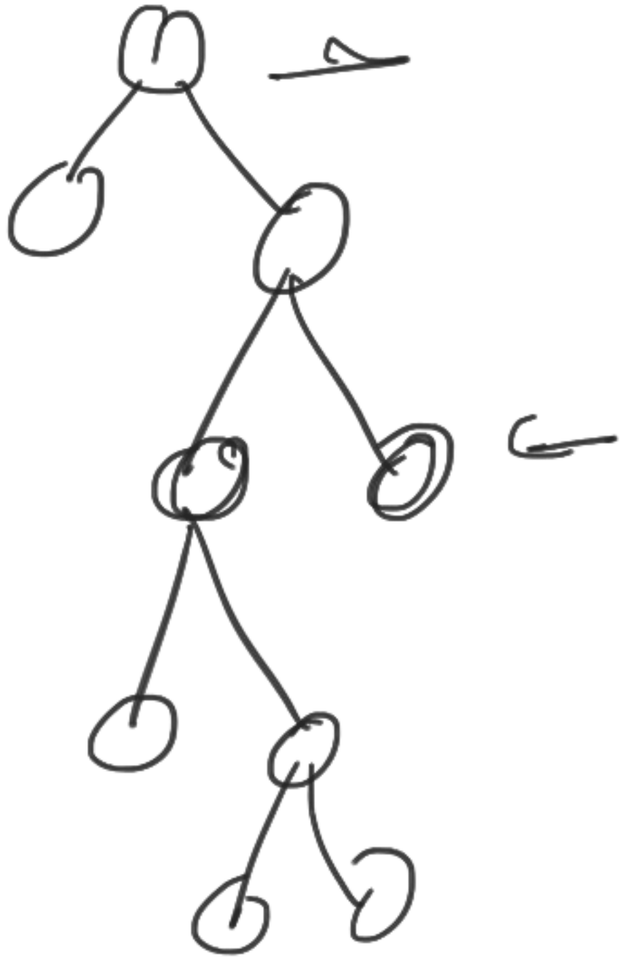
$S = 4 + 1$

Proof

CLRS

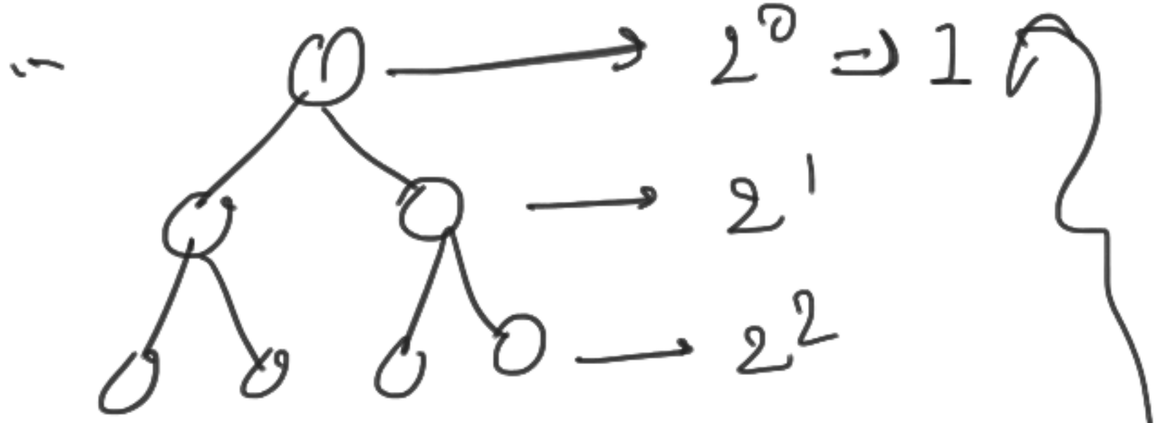
Ro





n leaf nodes → n-1

$$\Rightarrow \quad n + n-1 = 2n-1$$



h

$\Rightarrow 2^h = n$

$1 + 2 + 2^2 \cdots + 2^n$

$= 2^{n+1} - 1$

2^{d-1}

$1 \Rightarrow 2^d$

$2^0 + 2^1 + 2^2 + \cdots 2^{d-1}$

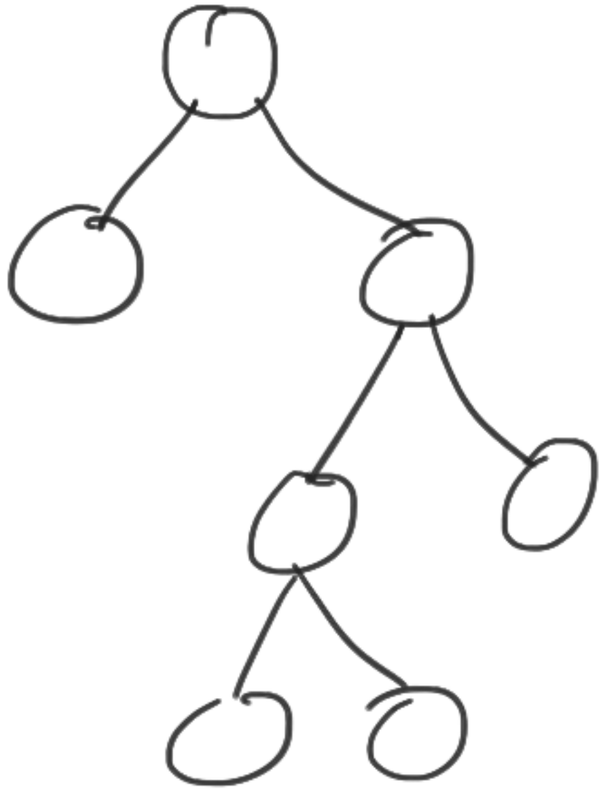
geometric series.

$1 + a + a^2 + a^3 \cdots a^n = \dfrac{a^{n+1} - 1}{a - 1}$

$2^{(d-1)+1} - 1 \Rightarrow 2^d - 1 \Rightarrow n - 1$

Induction → Recursion
→ Iteration

Algorithm



$(n+1)\left(\frac{n}{2}+1\right)$

$1 + 2 + 3 \ldots - - - n$

$= \frac{n(n+1)}{2}$

$1 + 2 - - \quad n+1$

$1 + 2 + \quad - - \; n + (n+1)$

$\frac{n(n+1)}{2} + (n+1)$

$\frac{(n+1)(n+2)}{2}$

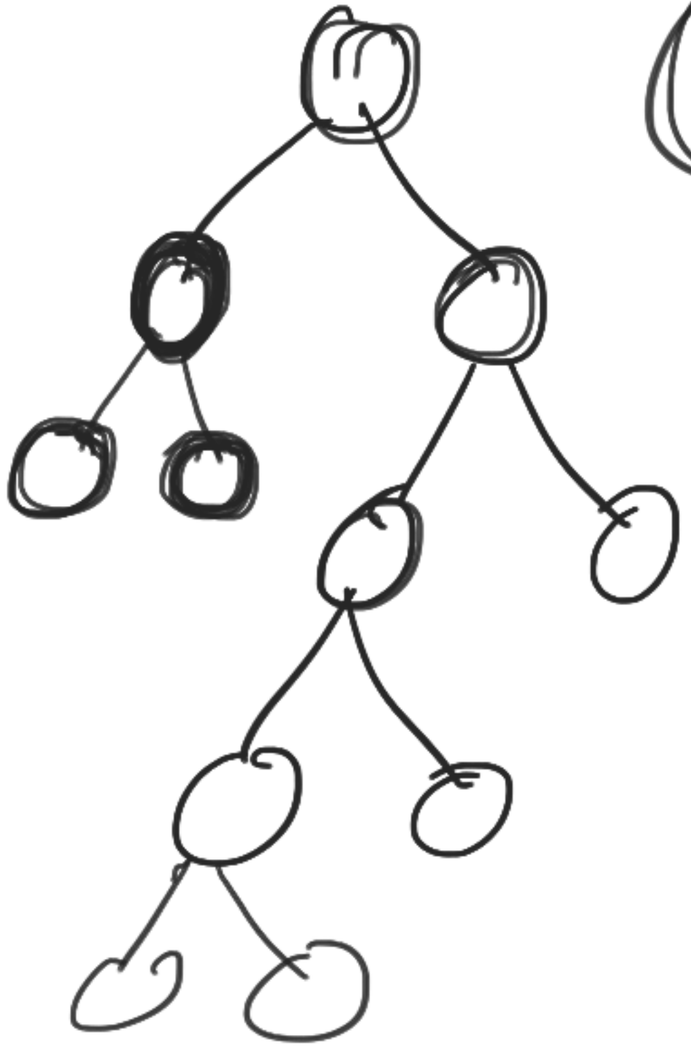
$n+2$

$\frac{(n+2)(n+3)}{2}$

$1+2+\cdots+n$

$= \frac{n(n+1)}{2}$

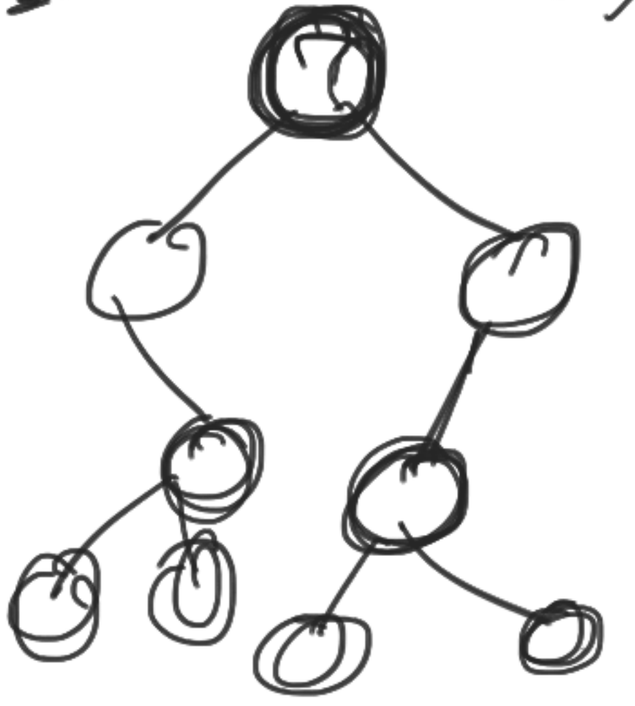
$\frac{(n+1)(n+2)}{2}$



$L = I + 1$

$\perp$

$\perp$

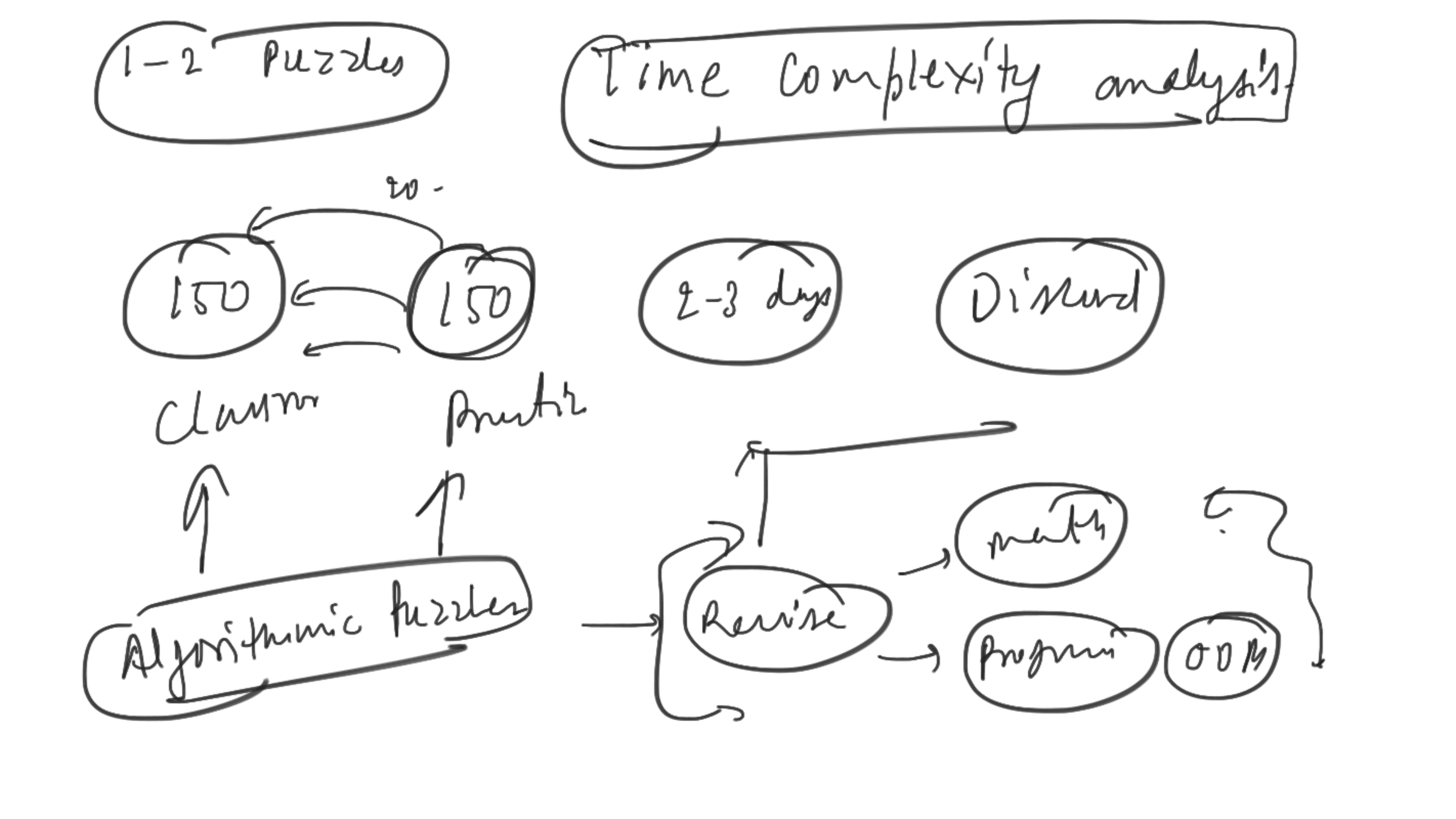


$\Rightarrow$

$I(2)$

$= L - 1$

$\Rightarrow L = I(2) + 1$


1-2 Puzzles
Time Complexity analysis
150
150
2-3 days
Discard
Algorithmic puzzles
Revise
Progress
OOM


3 days