



Binary Search - Problem Solving

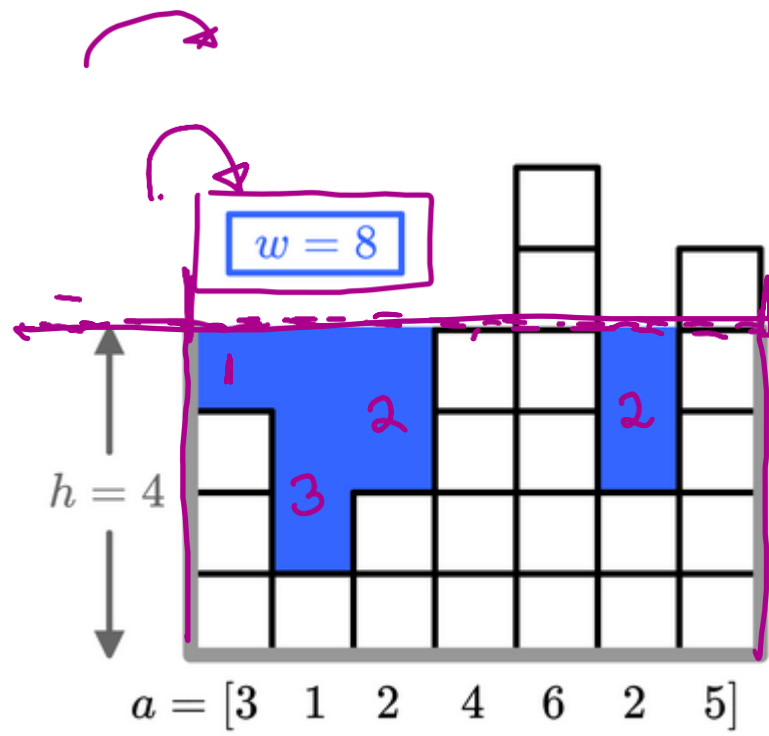
- Harsh Gupta



Problem 1

Building an Aquarium:

<https://codeforces.com/contest/1873/problem/E>

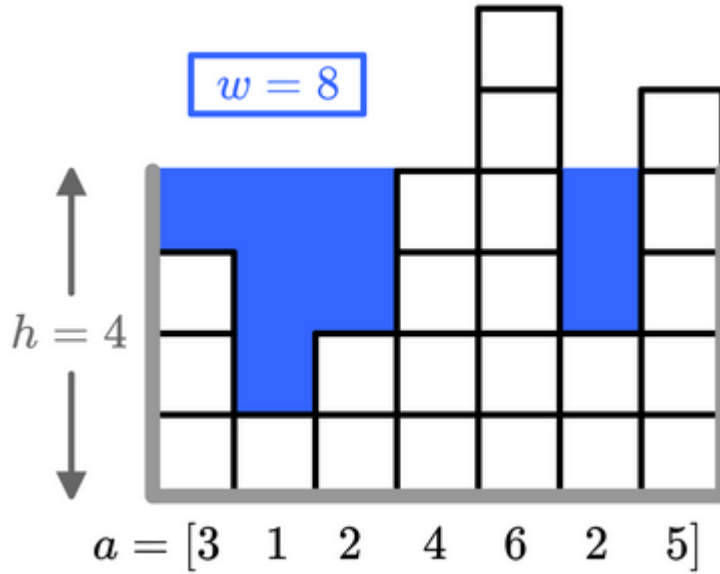


at most X

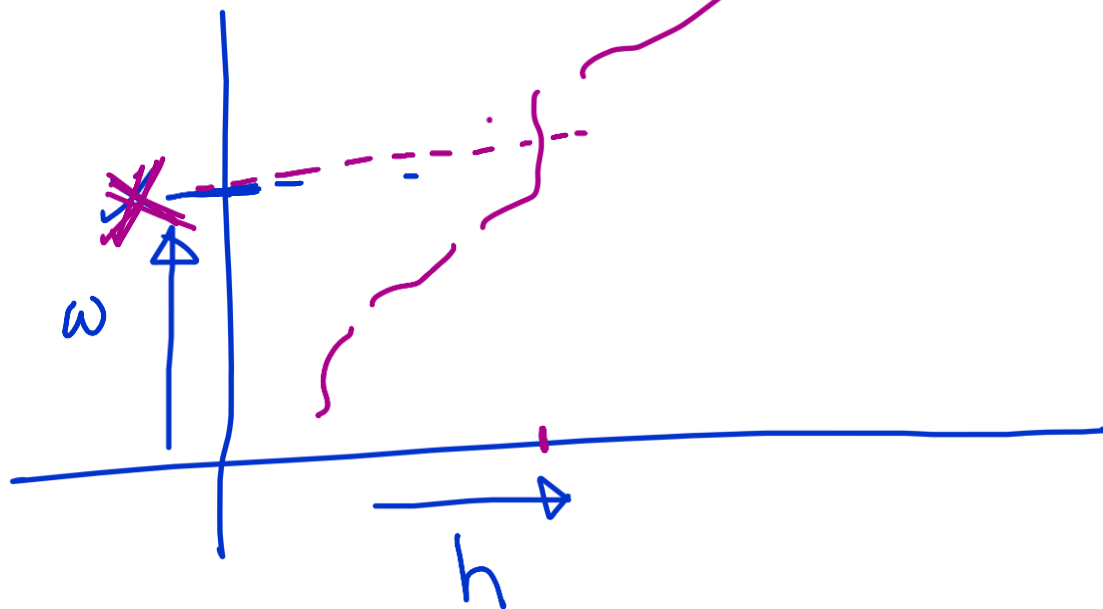
what is the maximum h you can get?



Constraint \rightarrow X



h ↑ ing w ↑ ing



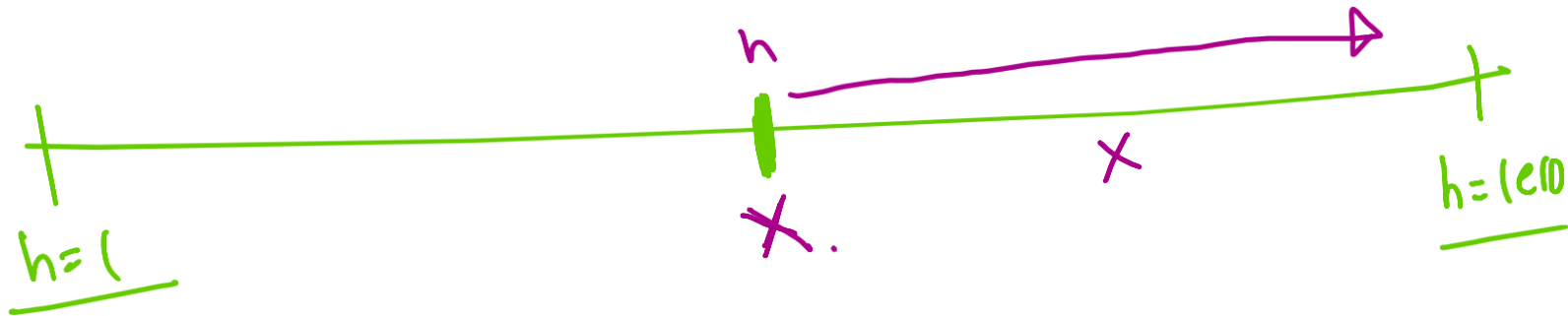
Binary Search \rightarrow maximize (with a constraint)
minimize (with a constraint)



$h \neq$ $w \neq$

$f(h) \rightarrow$ true if $\leq x$
 \rightarrow false if $> x$

$\log(1e10)$





$\leq x$

h



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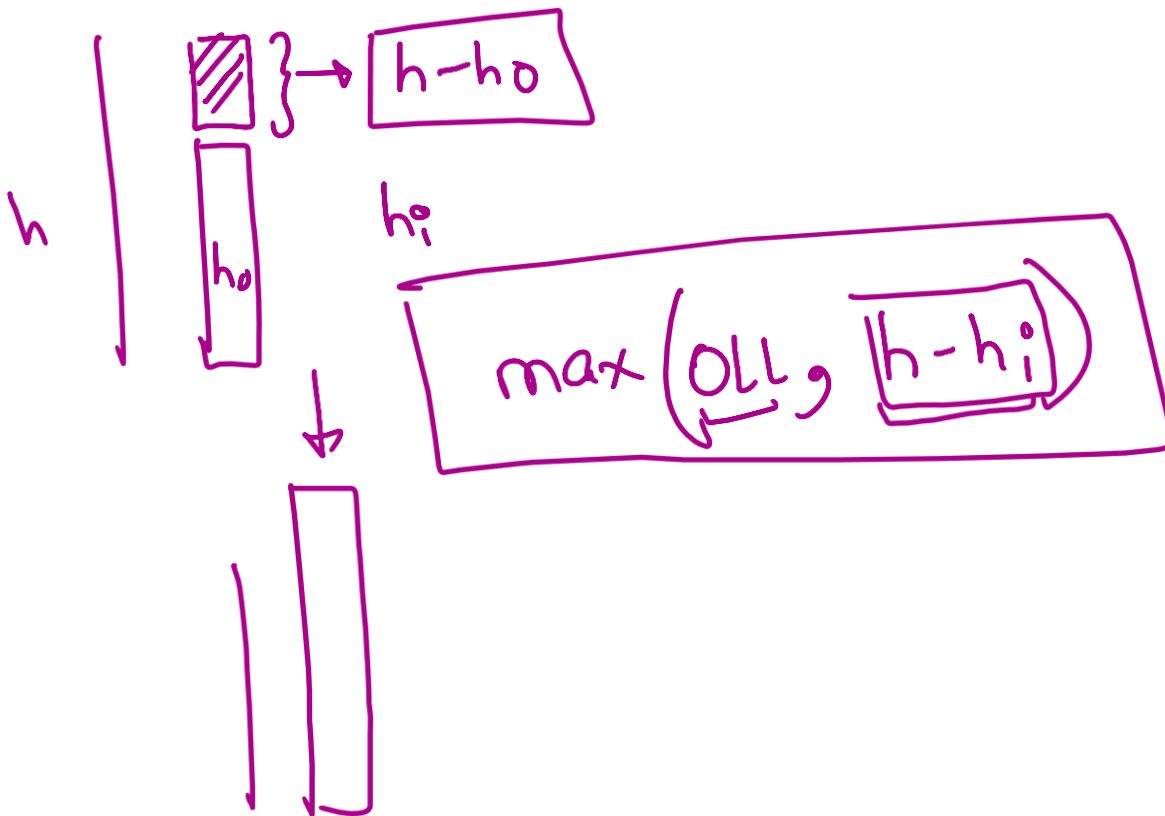
height

$> x$

$\leq x$

$\log_2 n$







Problem 2

Number of Flowers in Full Bloom:

<https://leetcode.com/problems/number-of-flowers-in-full-bloom/description/>



pairs ↓
↓
↓
↓
 $\{\underline{4}, 6\}, \{\underline{5}, \underline{2}\}, \{\underline{5}, 3\}, \{8, 9\}$

5

4

6

$\{\underline{5}, \text{INT_MIN}\}$

5

5

lower_bound($v. -$, $v. l$, $\underline{5}$)

↓
 $\{\underline{5}, \text{INT_MIN}\}$

4



5

5

8



(a_1, b_1)

(a_2, b_2)

(a_3, b_3)

(a_n, b_n)



$(1, 5)$

1 6



2



+1

P_1

4

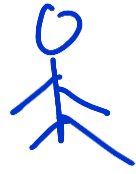


+1

P_2

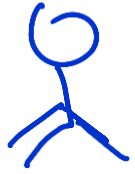


6



P_3

9



P_4

Sorted

Diff

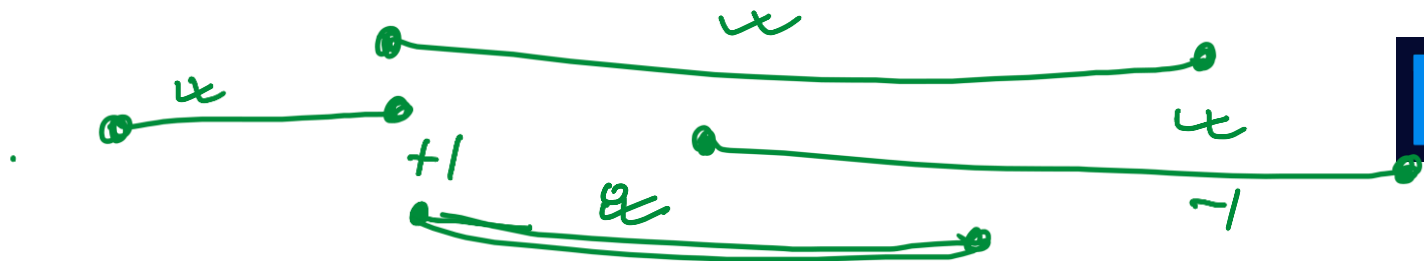
$(3, 3, 2)$



(a_i, b_i)

$\{3, 0\}, \{3, 1\}, \{2, 2\}$

$\left\{ \{\underline{2}, 2\}, \{\underline{3}, 0\}, \{\underline{3}, \cancel{1}\} \right\}$



P1



P2



P3



P4



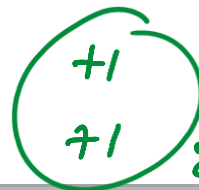
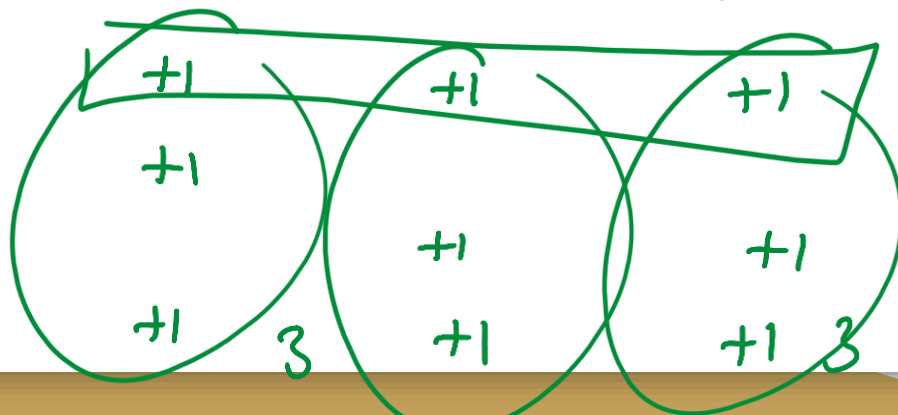
P5



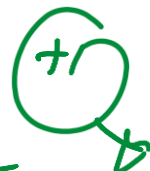
P6



3

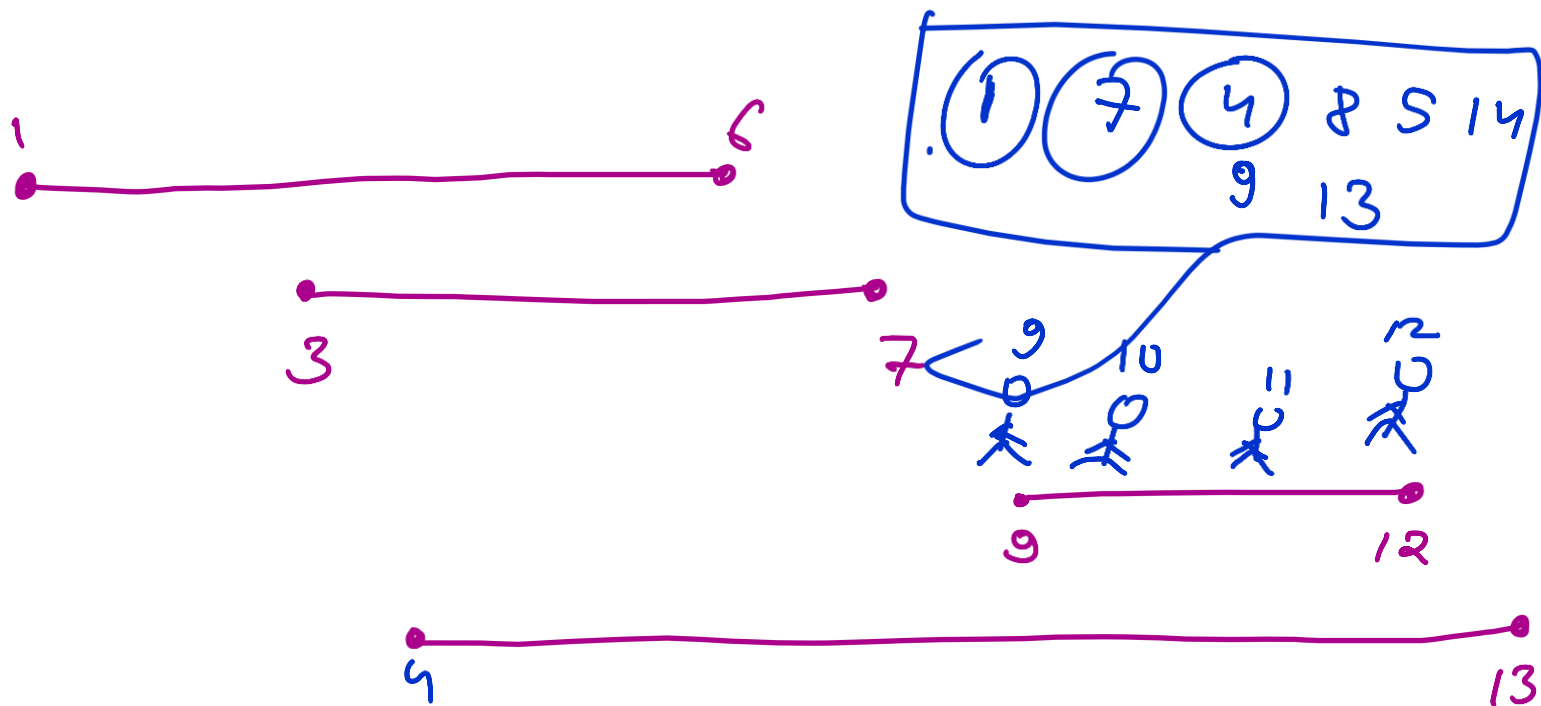


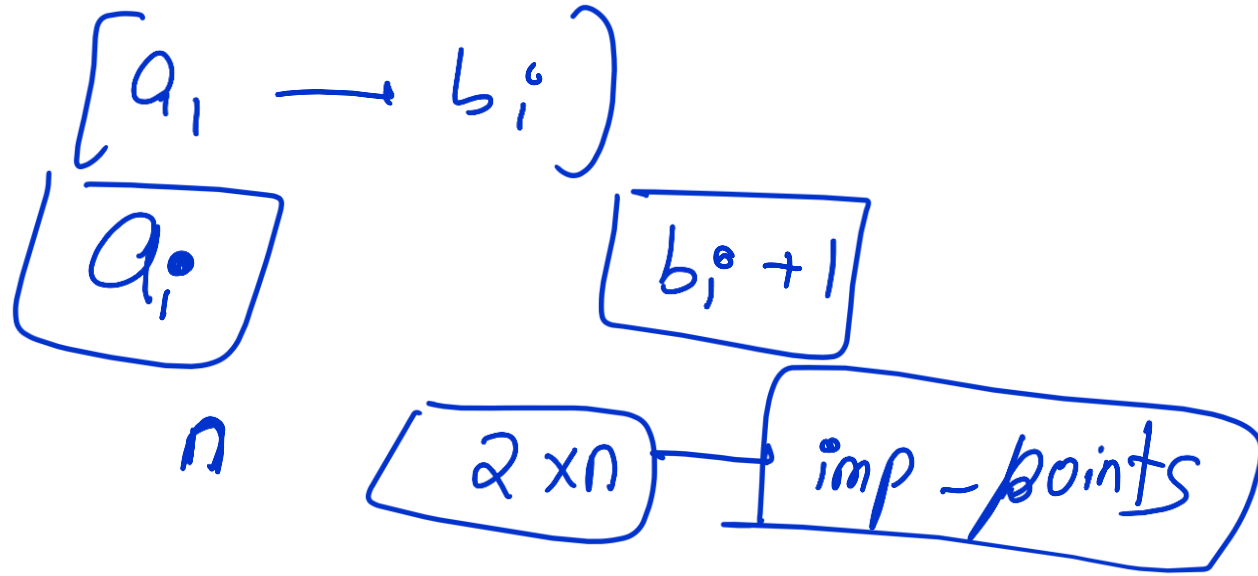
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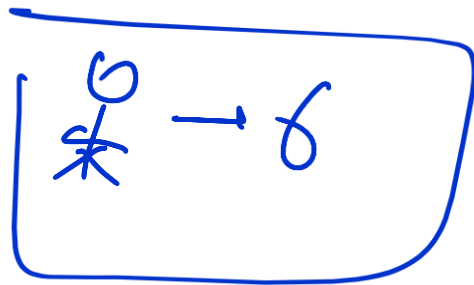
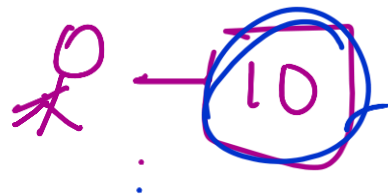


2

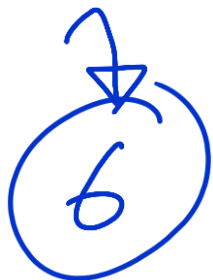
$[1, 6]$ $[3, 7]$ $[9, 12]$ $[4, 13]$







2



q_1



q_4

14

q_5