



Binary Search - Problem Solving

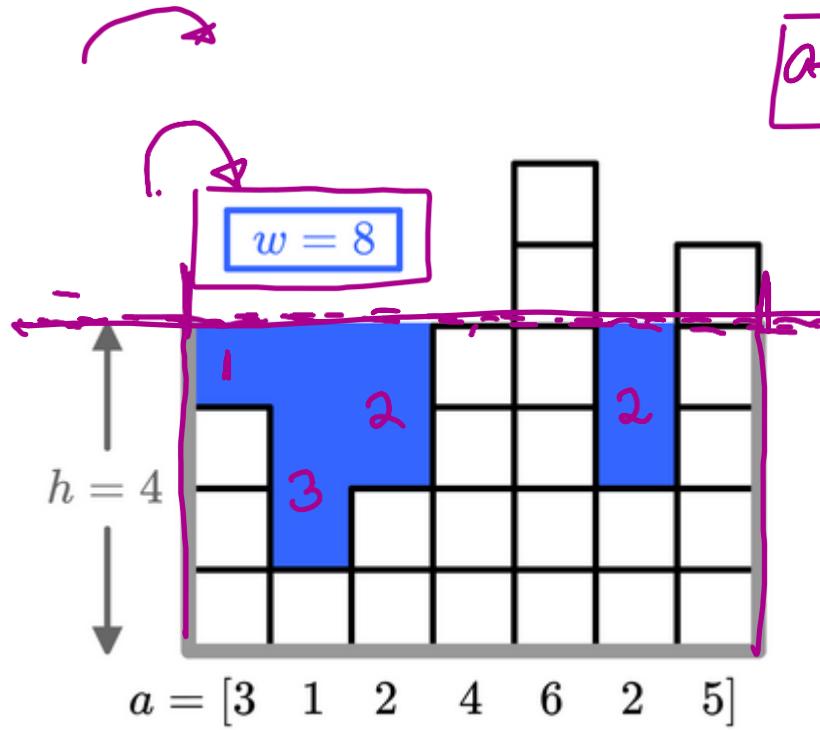
- Harsh Gupta



Problem 1

Building an Aquarium:

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

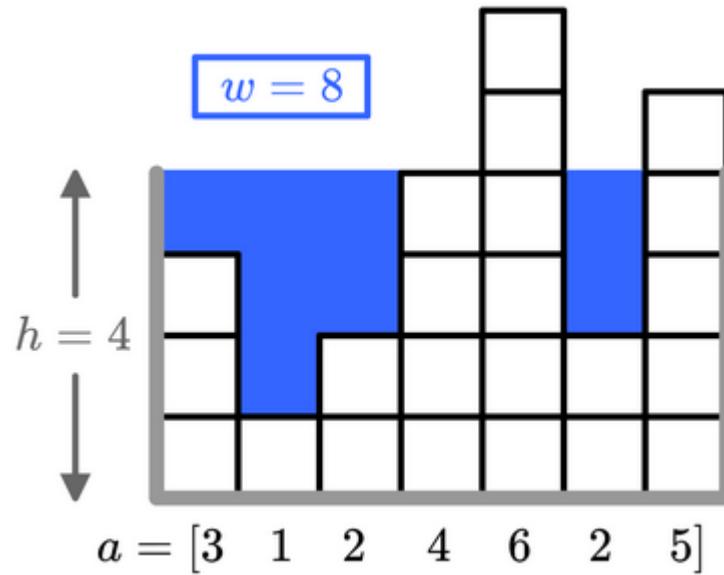


at most X



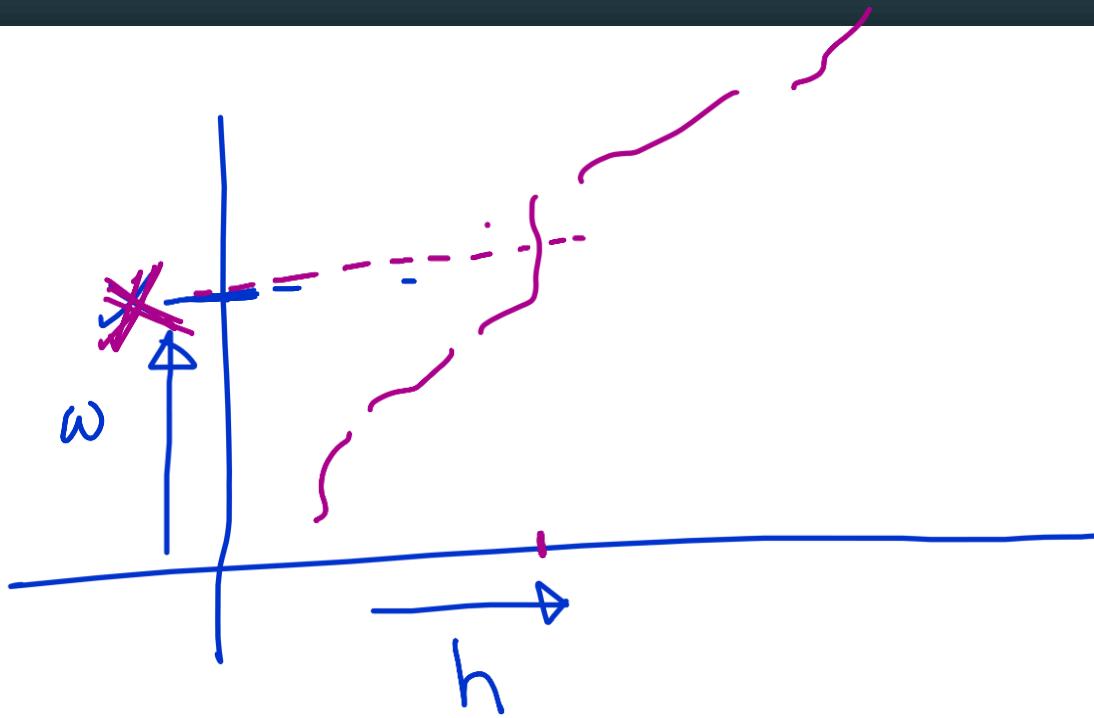
what is the
maximum h you
can get?

Constraint →



h^{\uparrow} ing

w^{\uparrow} ing



Binary Searches → maximize (with a constraint)

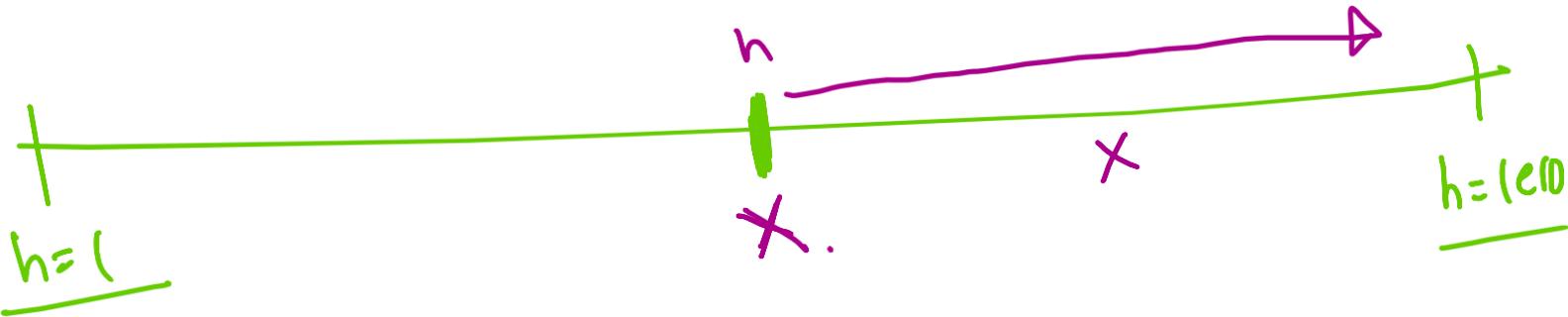


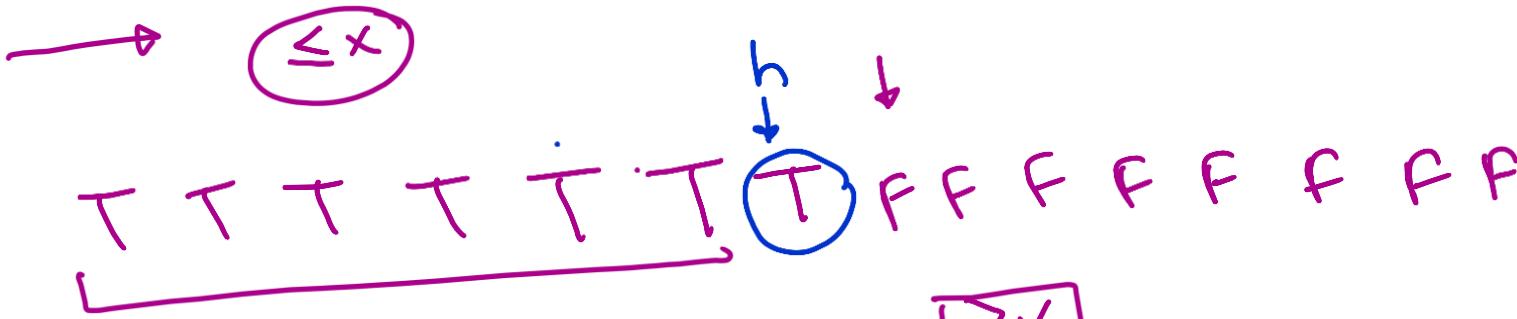
minimize (with a constraint)

$h \uparrow$ $w \uparrow$

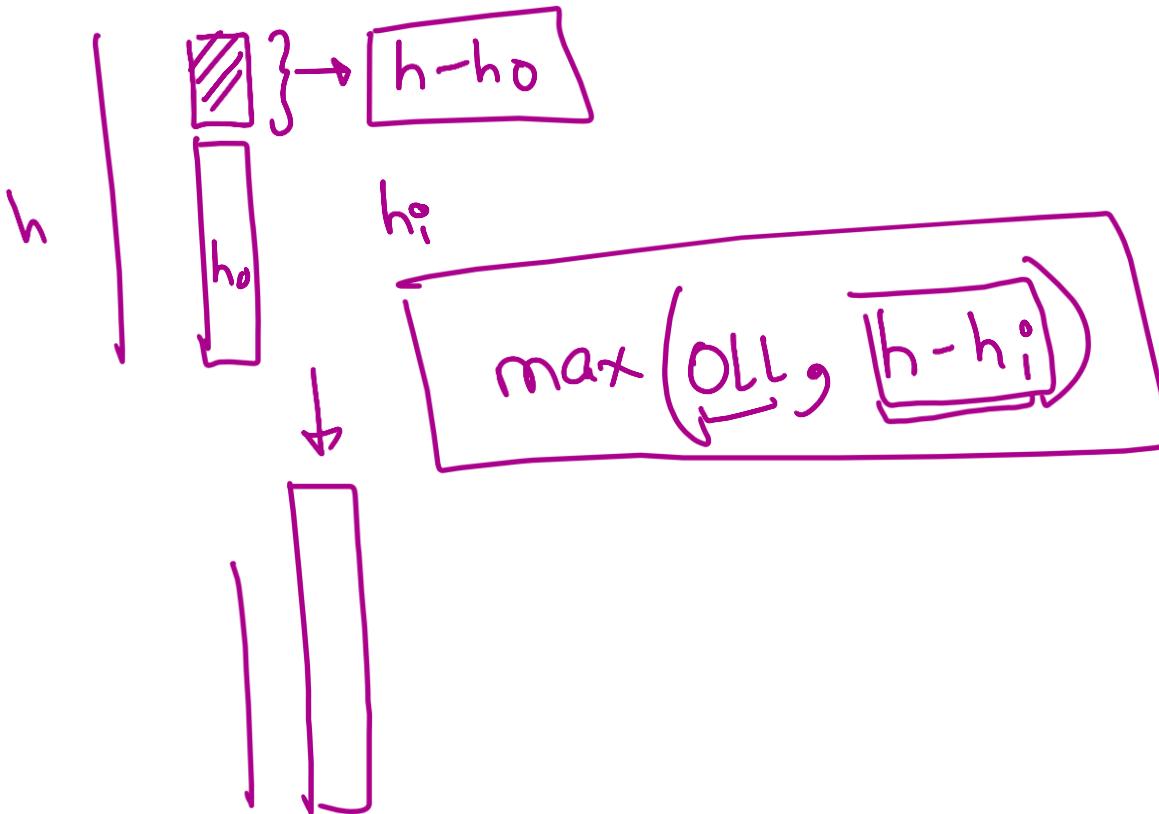
$f(h) \rightarrow$ true if $\leq x$
false if $> x$

$\log(1e10)$





T $\leq x$ $\log_2 n$





Problem 2

Number of Flowers in Full Bloom:

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

Pairs

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



5

4

6

5

INT-MIN

5

5

5

lower_bound(v.-, v.e,

$\{5, \underline{\text{INT-MIN}}\}$

4

5

5

8

5



(a_1, b_1) (a_2, b_2) (a_3, b_3) (a_n, b_n)  $(1, 5)$ $\boxed{1}$ $\boxed{6}$ $+1$ Sorted

2

4

6

9

0

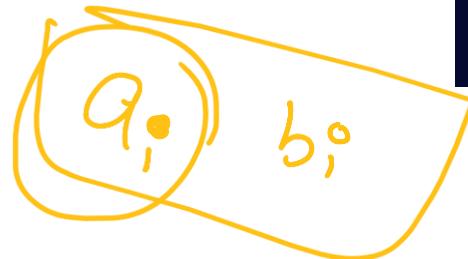
0

0

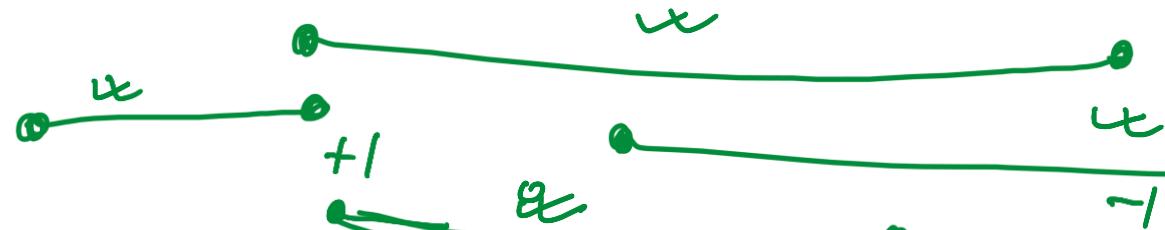
 $+1$ $+1$ p_1 p_2 p_3 p_4 Diff

(3, 3, 2)

{3, 0}, {3, 1}, {2, 2}



$\left\{ \begin{array}{l} \{2, 2\} \\ \{3, 0\} \\ \{3, 1\} \end{array} \right\}$



P_1

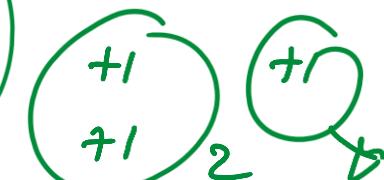
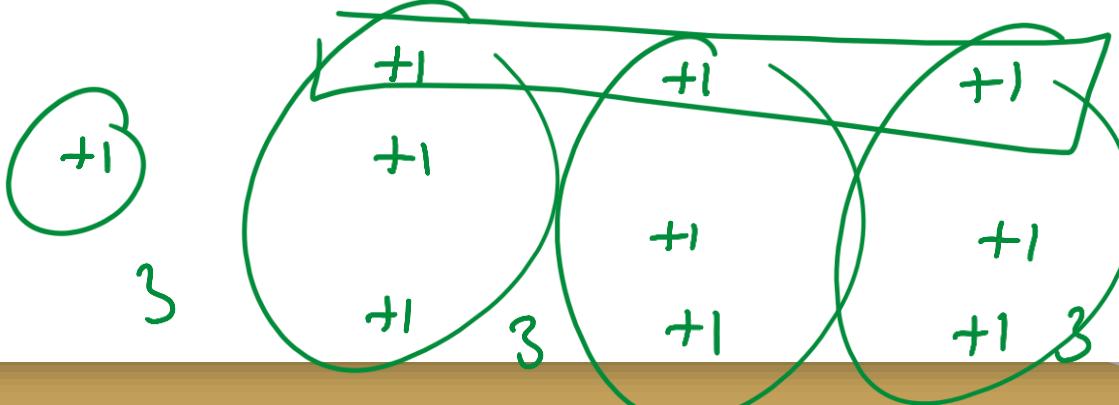
P_2

P_3

P_4

P_5

P_6



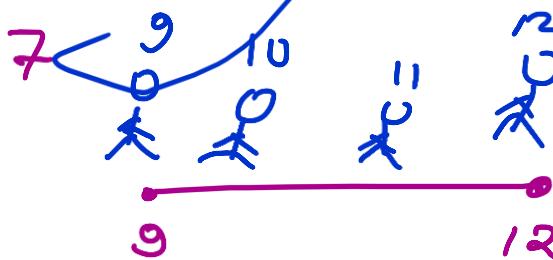
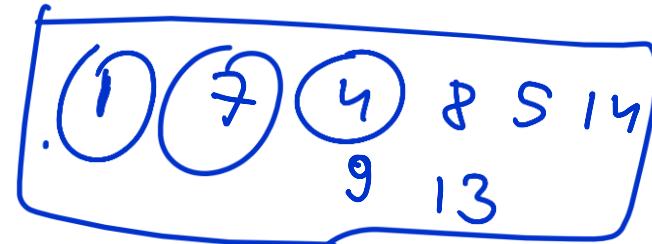
$[1, 6)$ $[3, 7]$ $(9, 12]$ $[4, 13)$



1 6

3

9



13



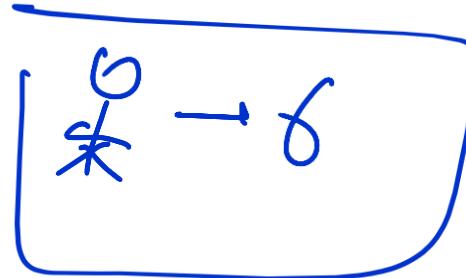
$$\left[\begin{matrix} a_1 & \rightarrow & b_i \\ \hline a_i \end{matrix} \right]$$

$$b_1^{\circ} + 1$$

9

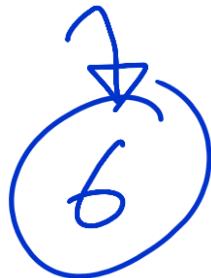
2 x n

imp-points

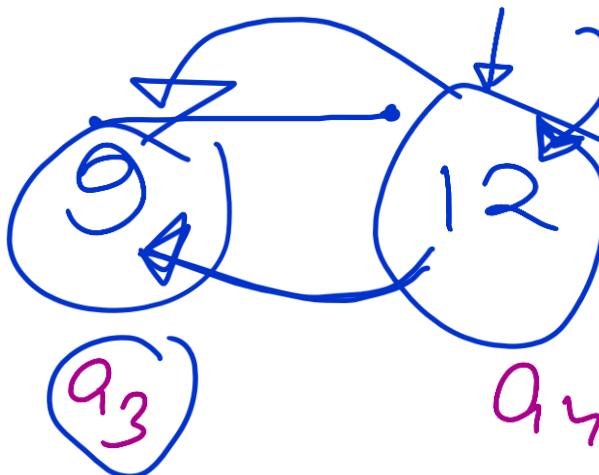


2

a_1



a_2



a_3

a_4

14

a_5