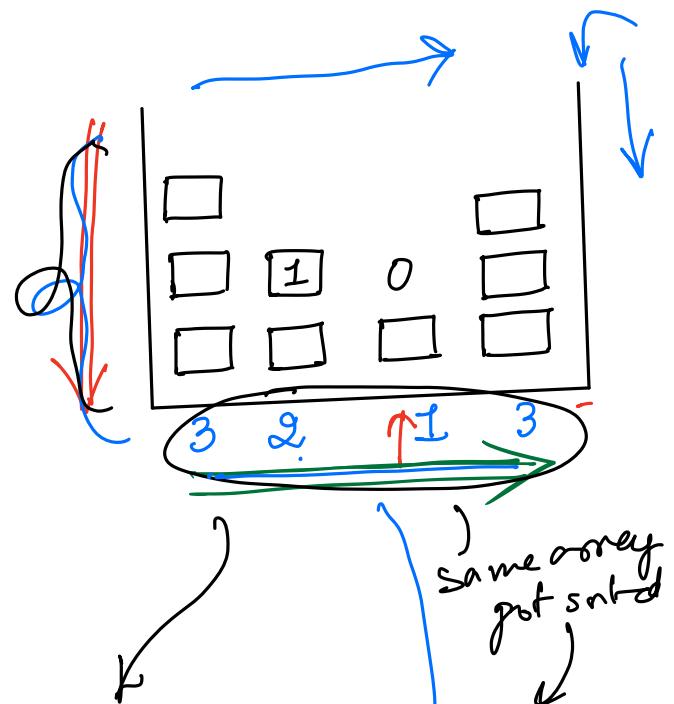


## • Gravity flip

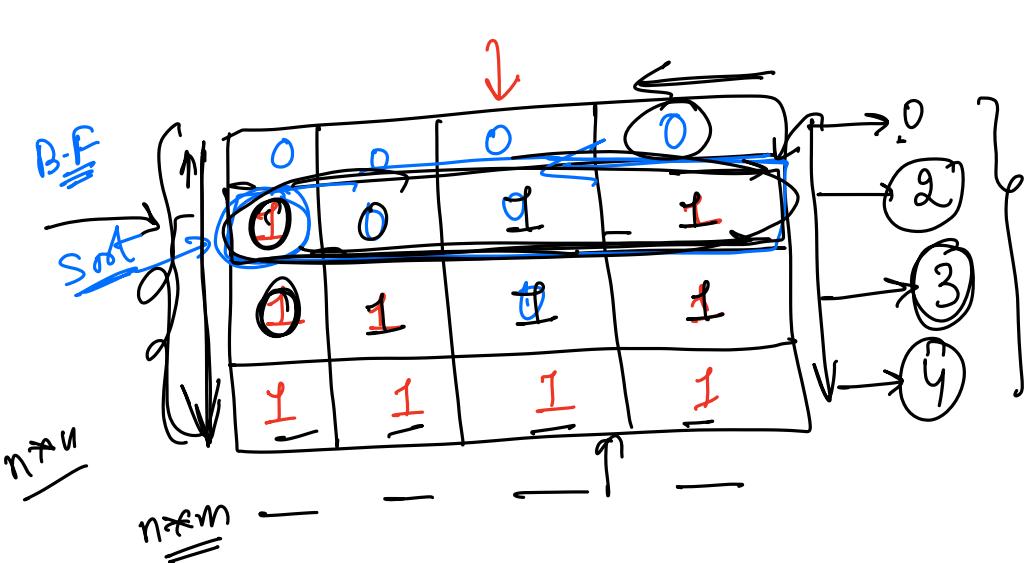
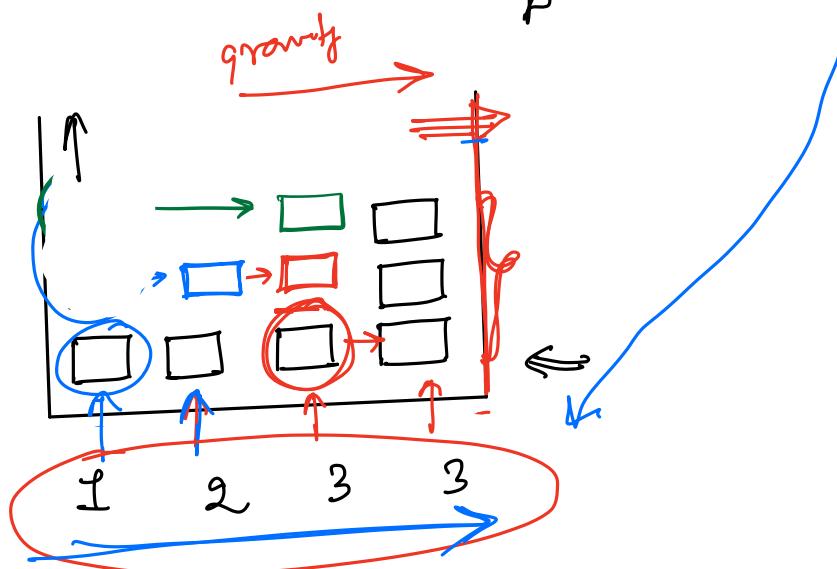
box → square cubes

gravity changes its dir<sup>n</sup>  
left to right

give the no. of cubes in  
every column after  
gravity change.



) same area  
got sorted



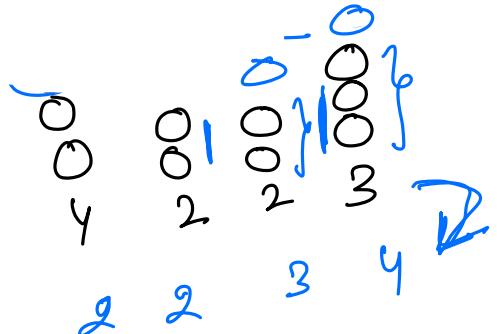
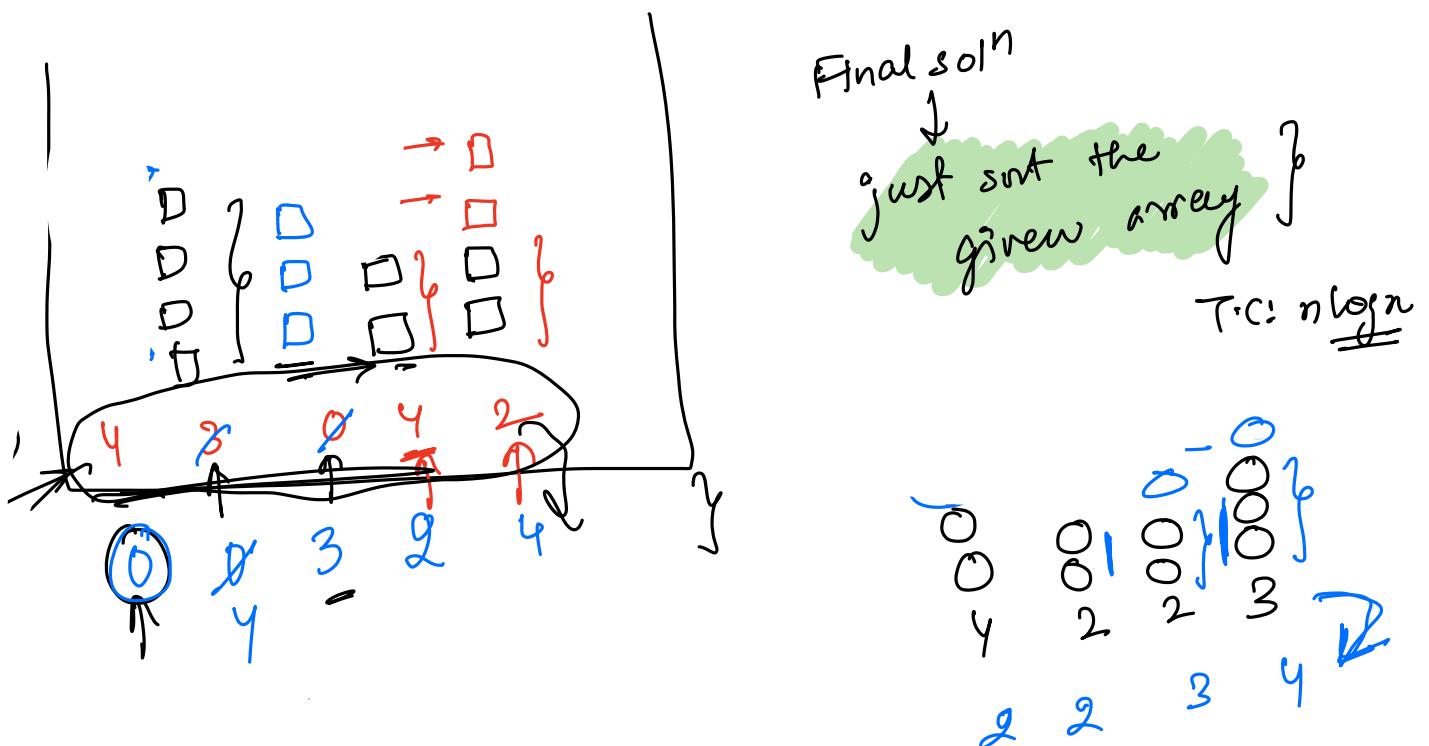
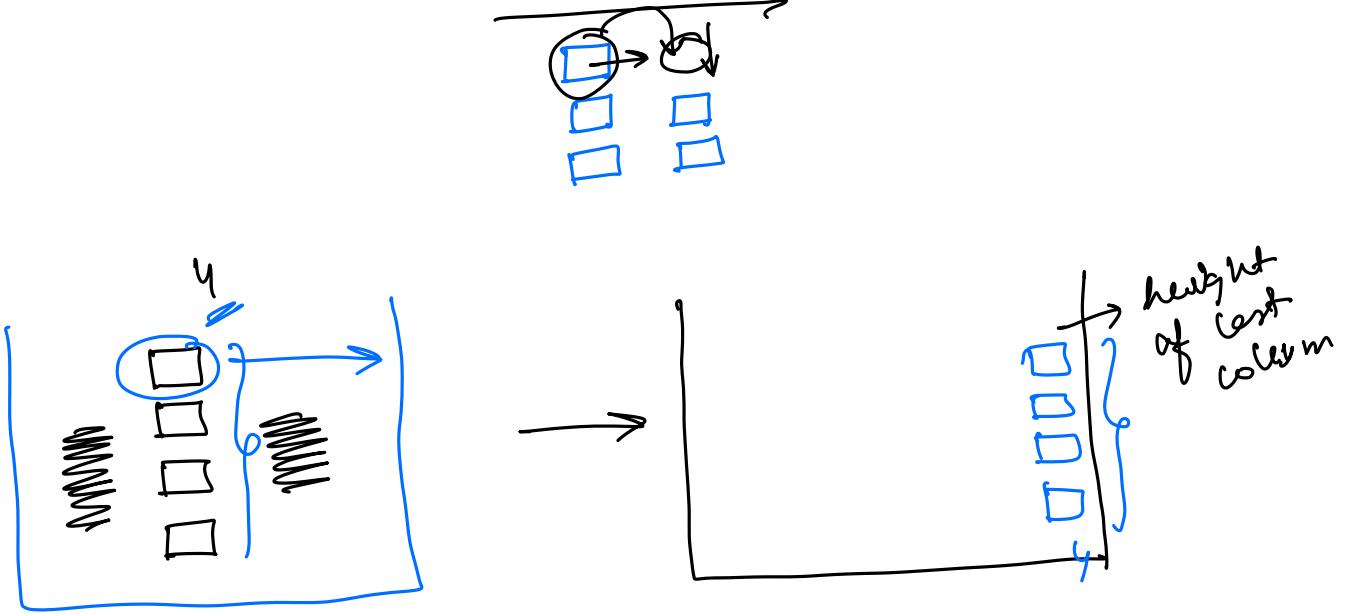
$$\begin{aligned} T.C &:= O(n^2) \\ T.C &:= O(n \times m) \\ S.C &:= O(n \times m) \end{aligned}$$

Obs → The result is sorted

1    3    2    4 ↴

higher value

space  
lower value



28

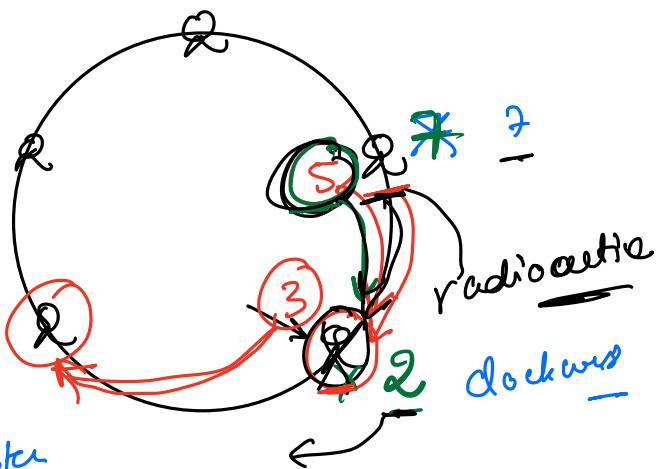
circle of monsters

kill it

health[i] = health of monster<sup>i</sup>

1 bullet = 1 unit of health

damage[i] = damage  $i^{\text{th}}$  monster  
will give  $i+1^{\text{th}}$  monster



Q? minimum bullets you should use  
every monster is killed!

③

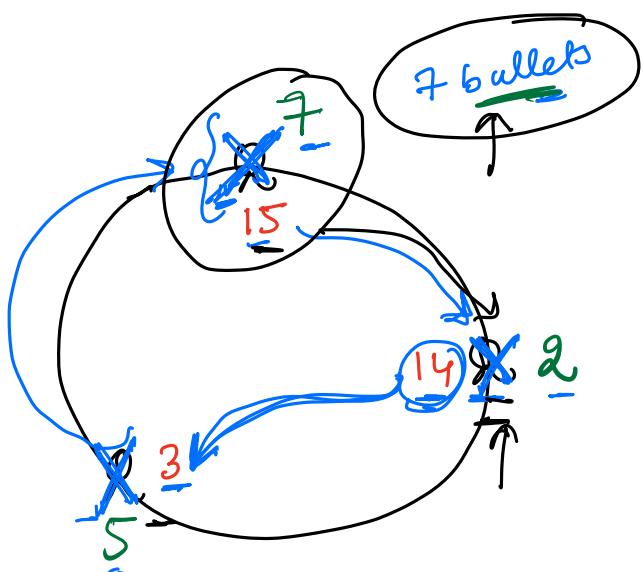
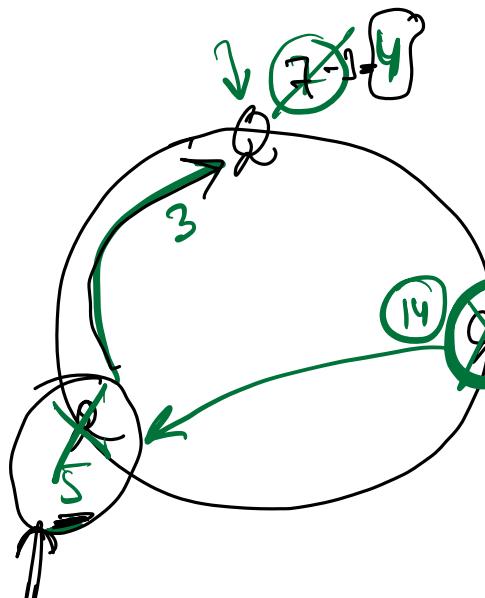
health :

7      2  
—  
15     14

5  
—  
3

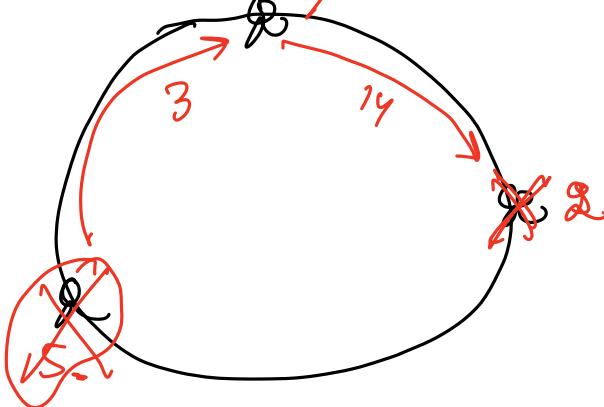
damage :

7-1-4



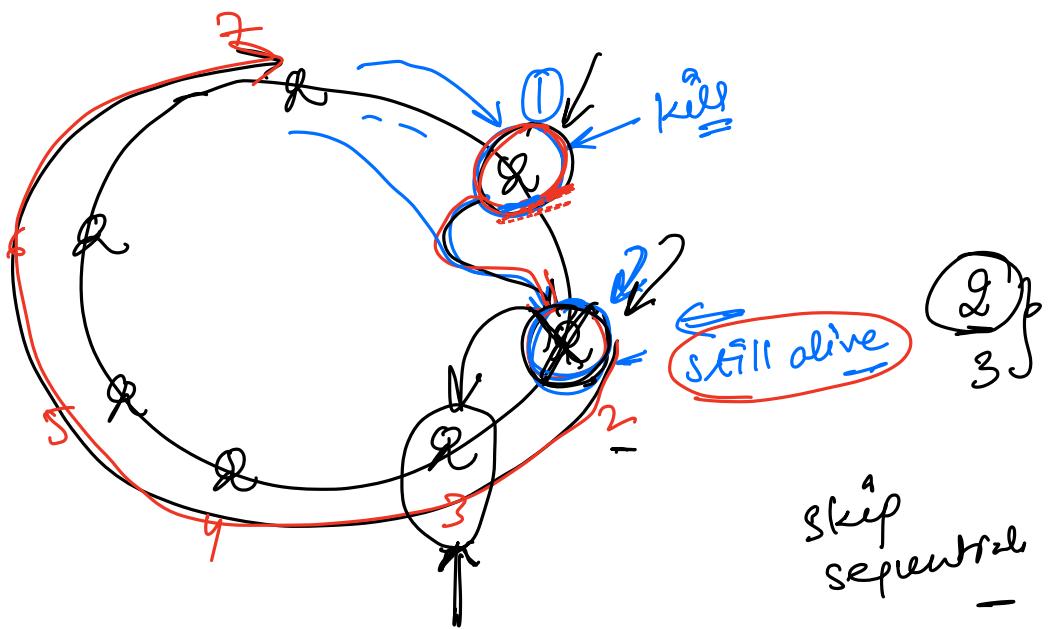
2 + 4  
6

7 Bullets?



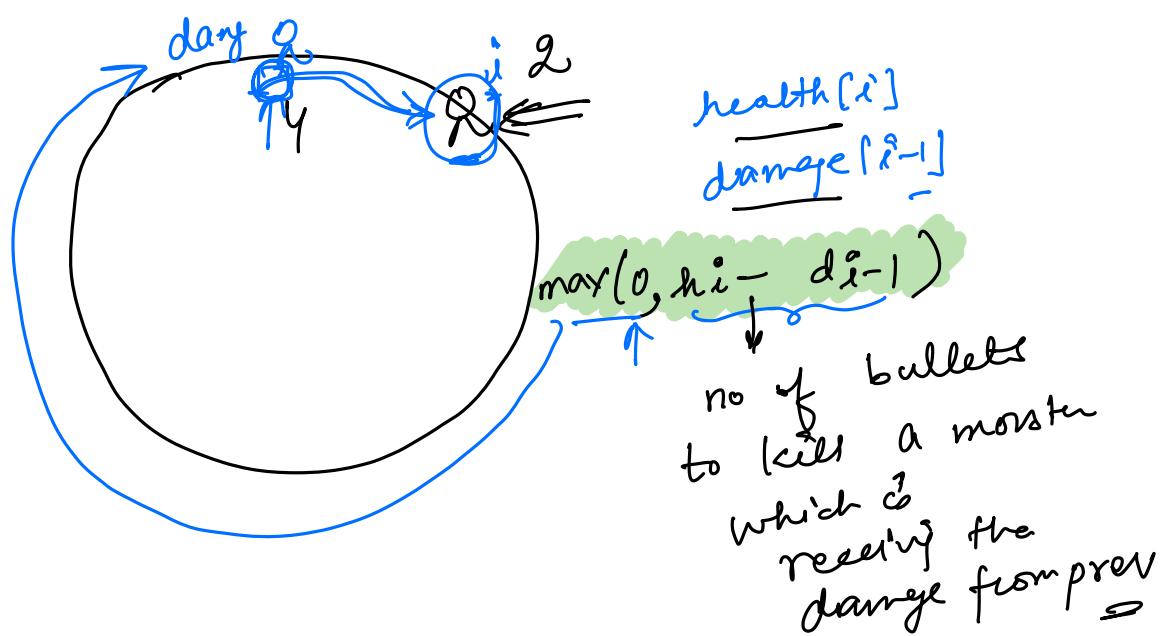
5 bullets  
4 bullets

9 bullets



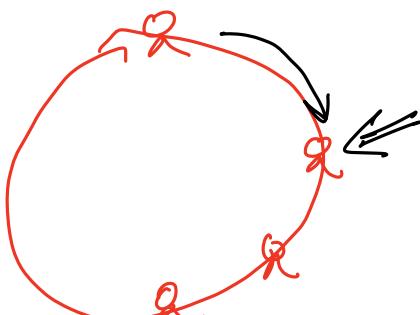
Obs 1:- If you choose a monster to start with → go sequentially

B.F → consider every monster as a starting point }  
 → calculate no of bullets }  $T.C: O(n^2)$

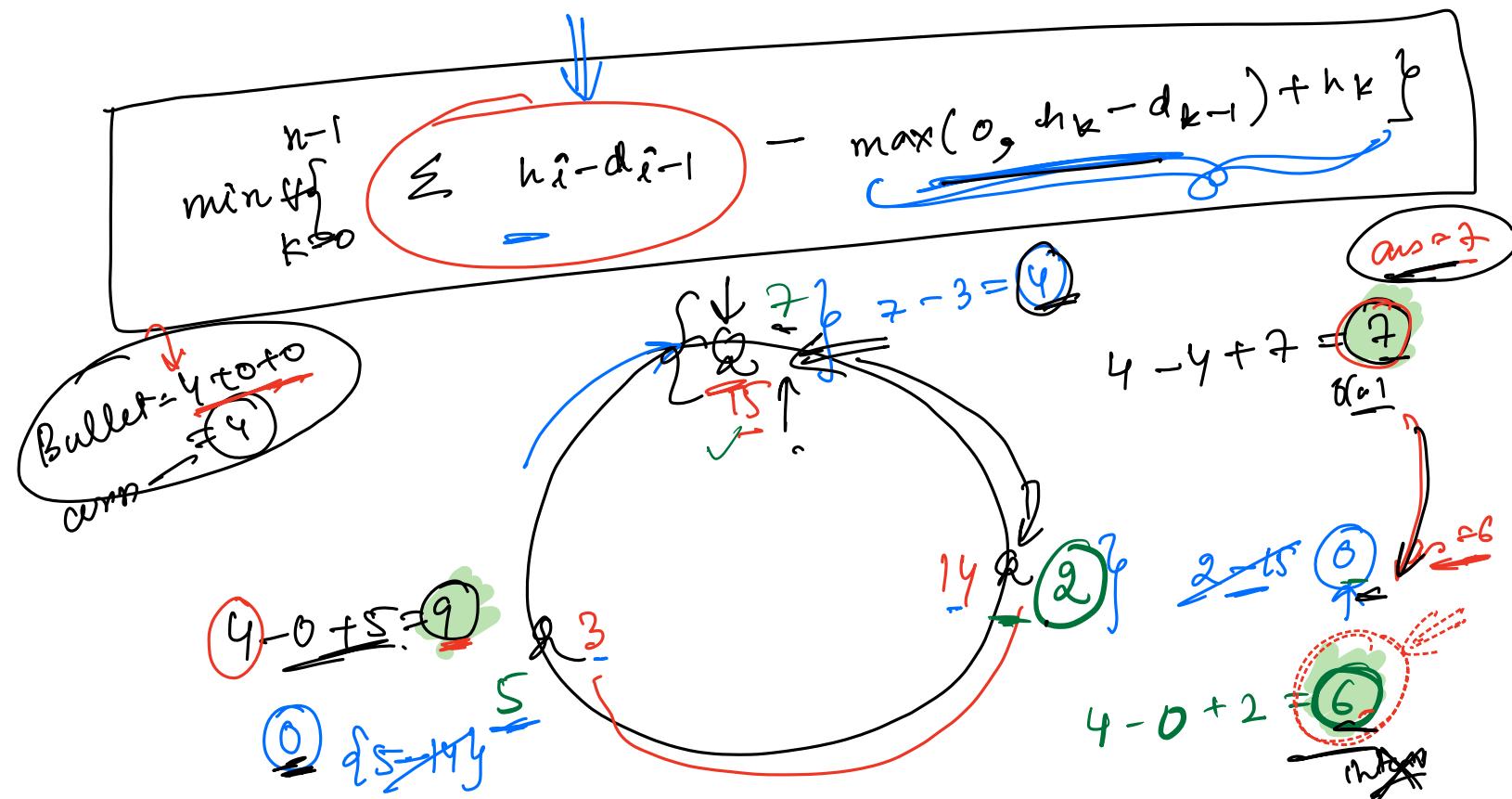
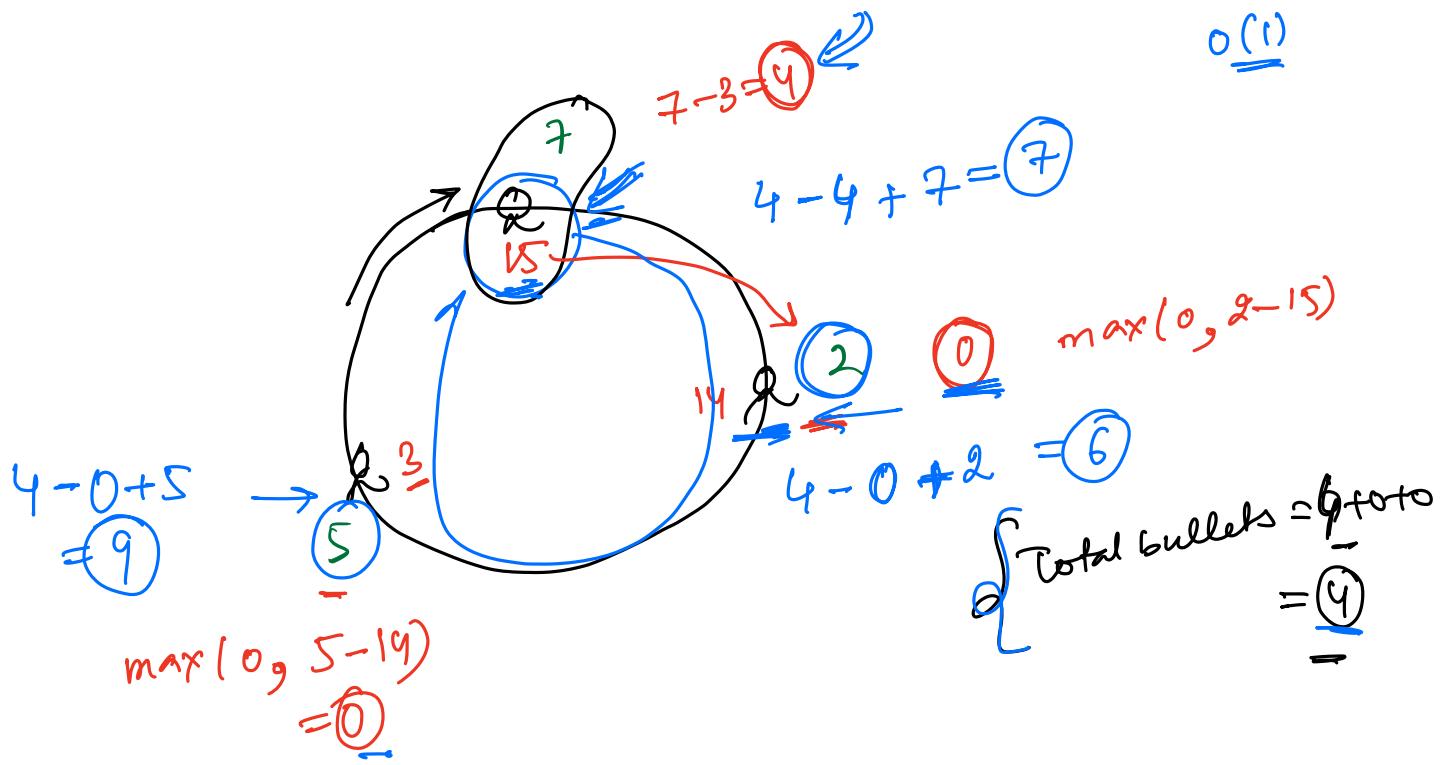
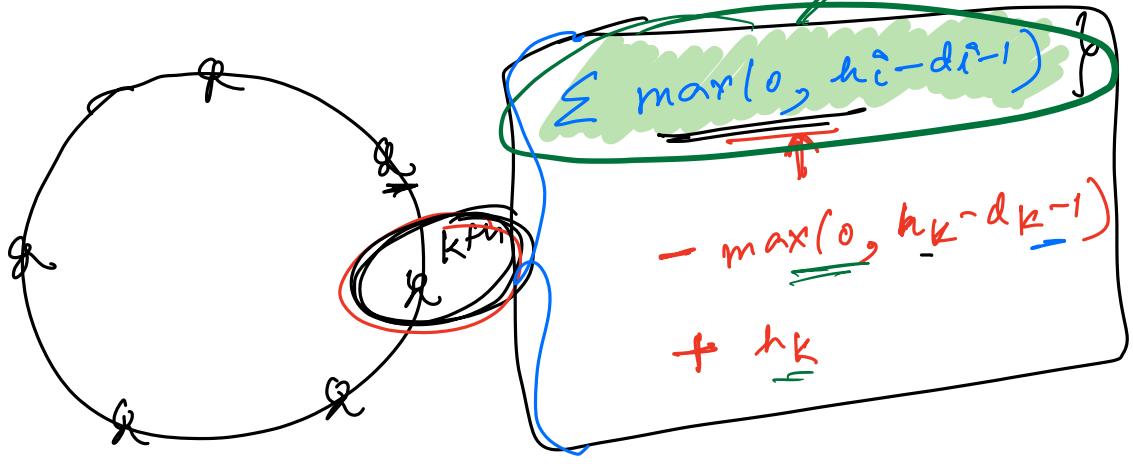


every monster will receive damage?

(starting)



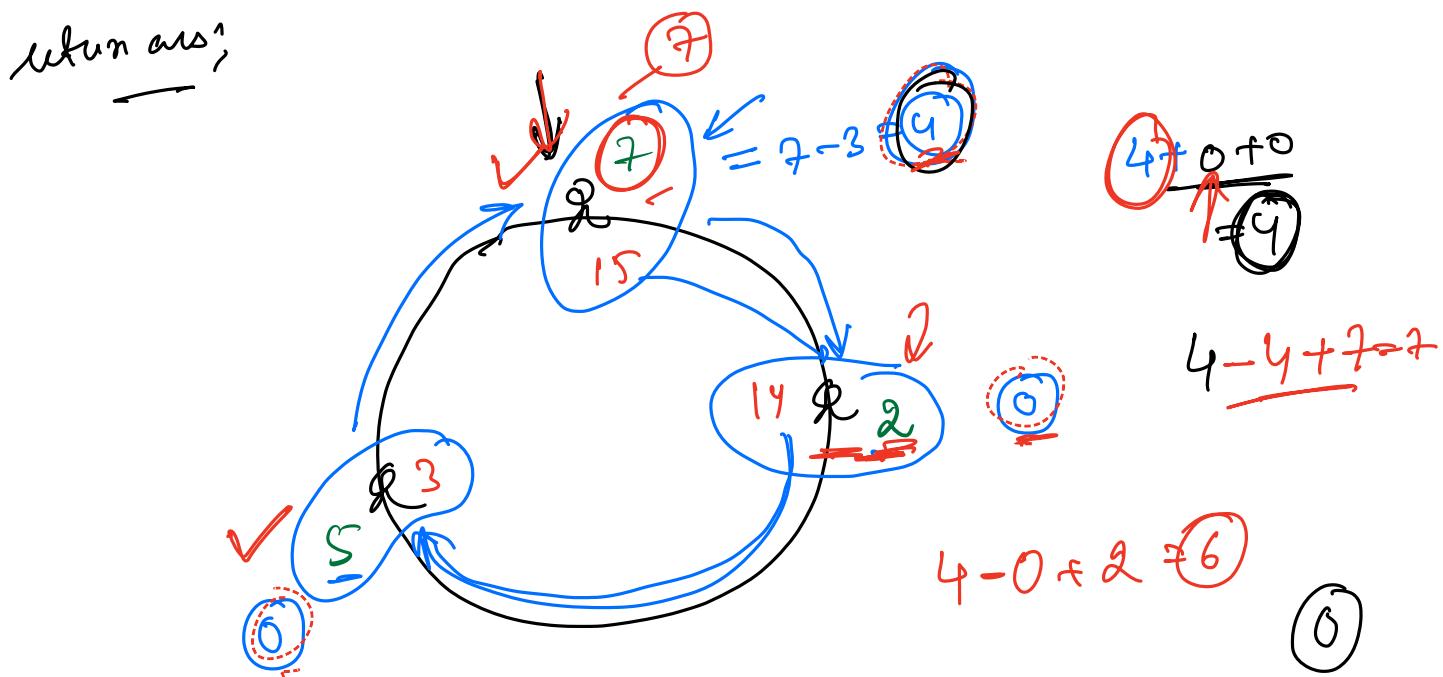
$O(1)$



1) pre-compute  $\sum_{i=1}^n \max(0, h_k^i - d_{k-1}) = curr$   $\{O(n)$   
 $ans = \infty$

for  $R=0 \rightarrow n$   $\{O(n)$   
 $\{ ans = \min(ans, curr - \max(0, h_k^R - d_{k-1}) + h_k^R \})$

return ans;



3) You are given with  $N$  integers  
 - given  $[L, R]$  - increasing + same  
 { 9 queries  
 if array from  $L \rightarrow R$  is non-decreasing  
 → yes  
 otherwise → No

9 queries  
 9 - 2-4  
 0-1  
 1-3  
 NO

3 < 4  
 7 > 3  
 4

Brute force →

for  $i = d$  →  $l <= i - 1$

$\{ a[i] > a[i+1]$

return NO

return YES

traverse from L to R

$O(q * n)$

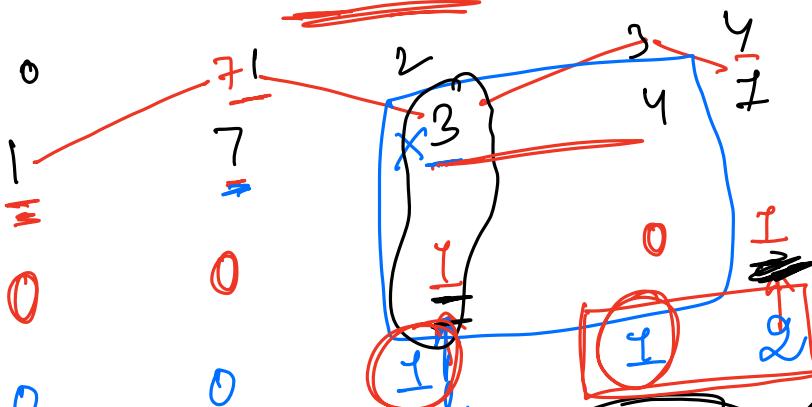
Sum

$O(1)$

decreasing part



$$a[i] < a[i-1]$$



pfsum

$l \rightarrow r$

$l+1 \rightarrow r$

calculate count of decreasing pt.

LLR

No

Yes

$1 - 4 \rightarrow 2$

$0 - 1 \rightarrow 0$

$2 - 3 \rightarrow 0$

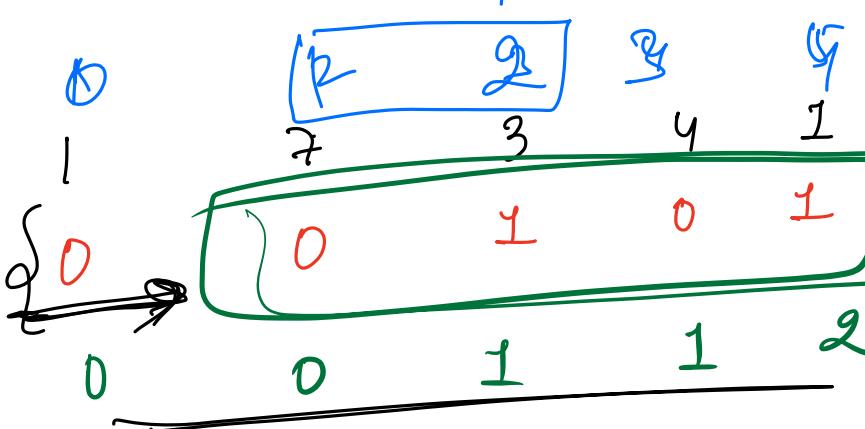
$2 - 4 \rightarrow 2$

$1 - 2 \rightarrow 2$

$3 - 3 \rightarrow 0$

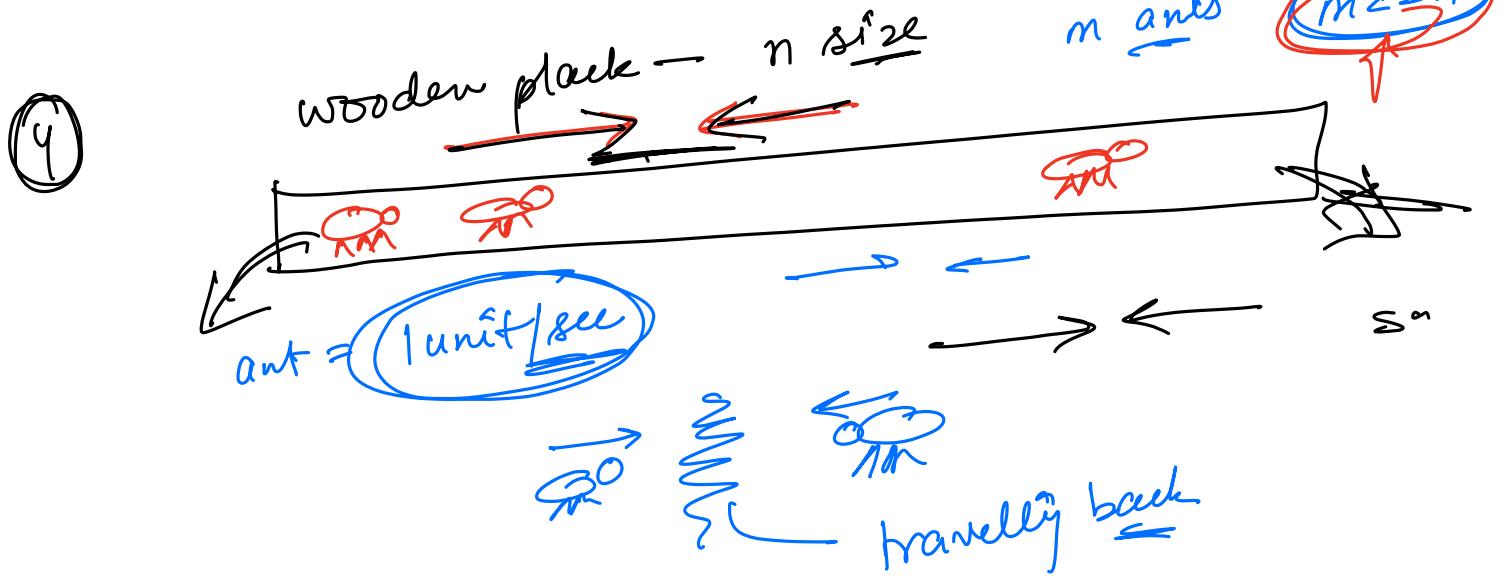
$pf(2) - pf(1) -$

$pf(3) - pf(2) -$

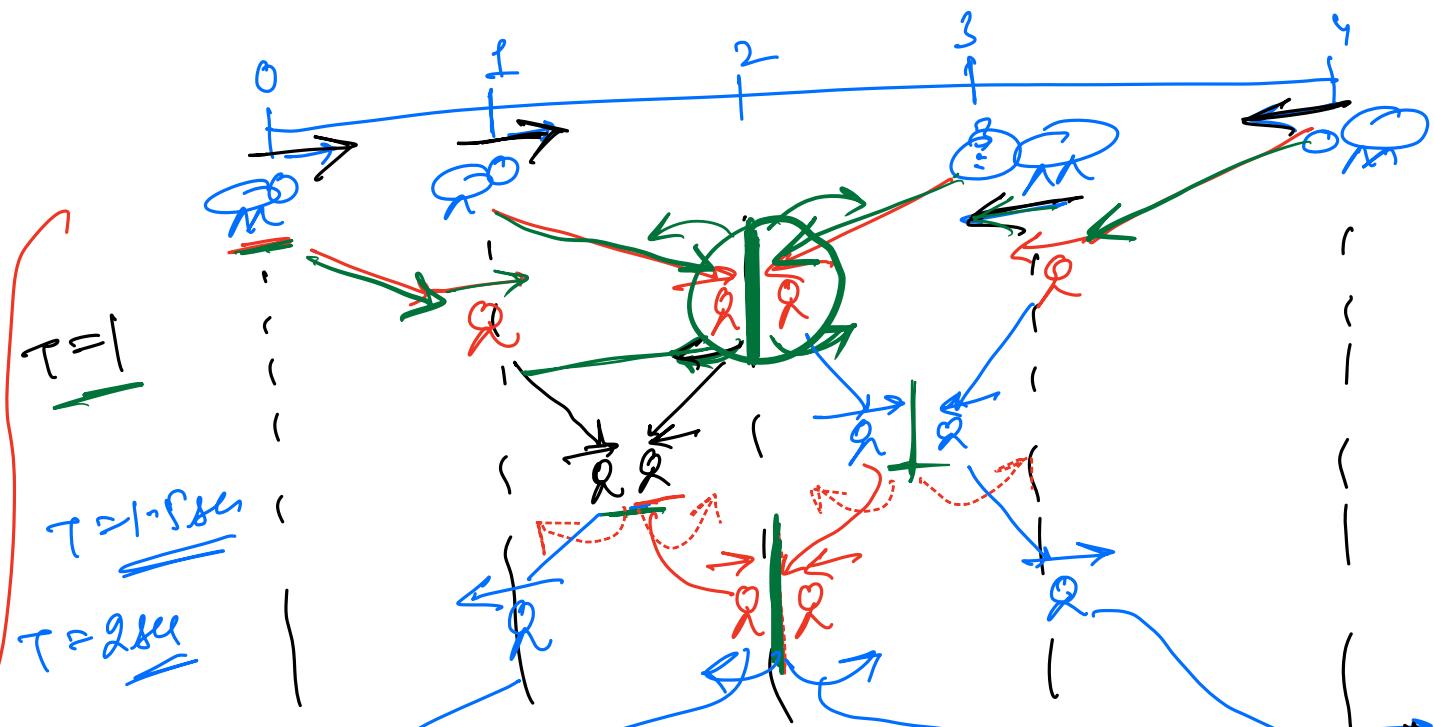


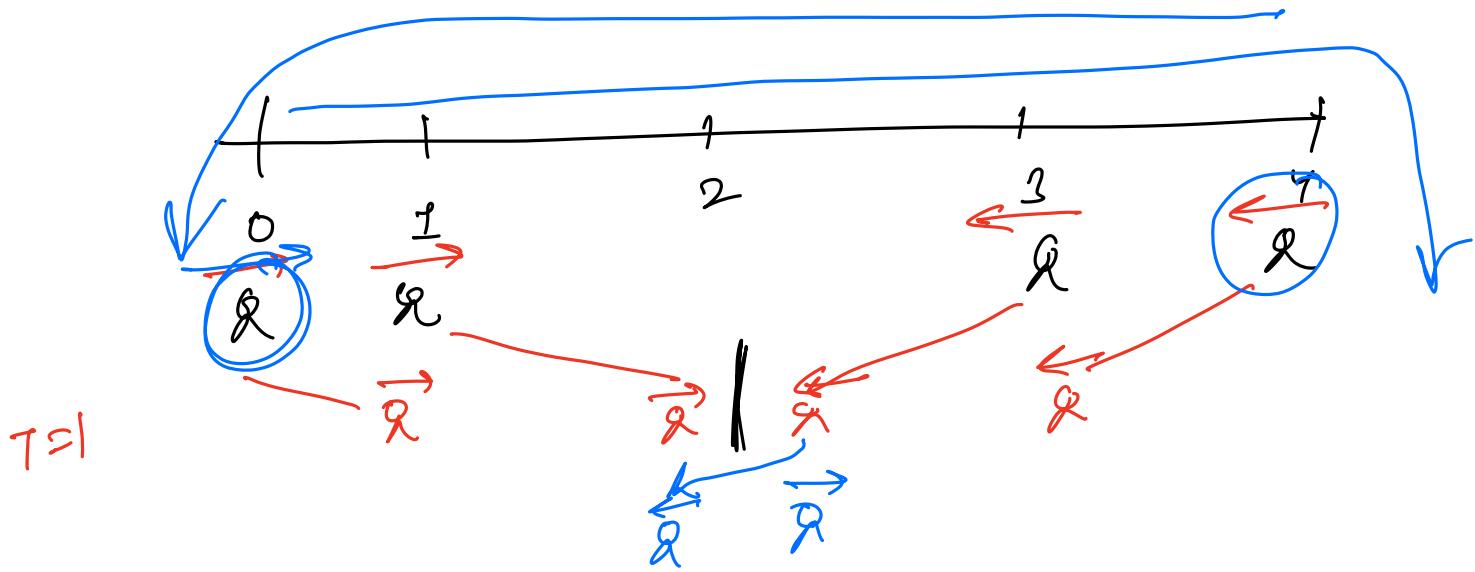
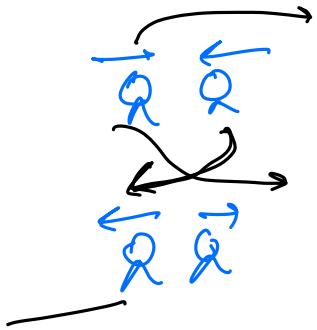
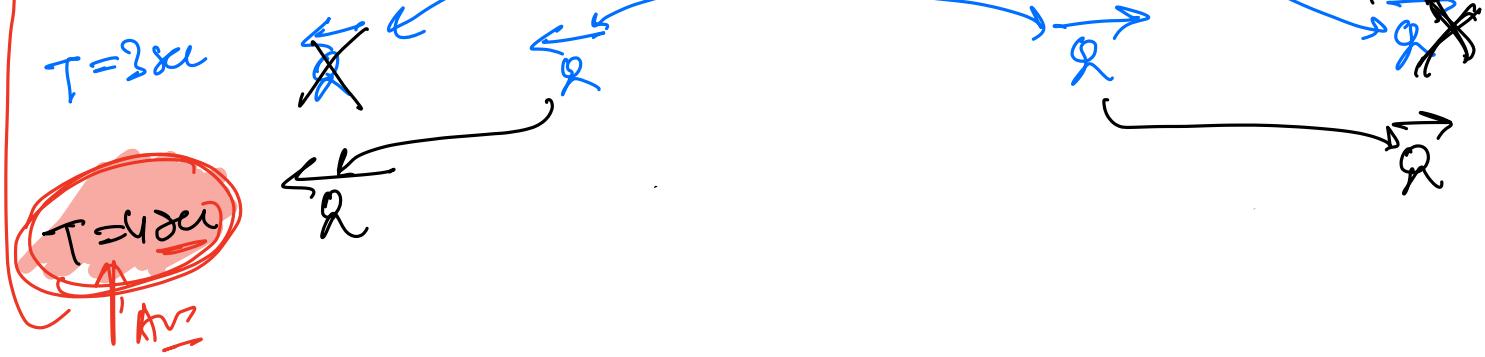
$l, r \rightarrow pf(r) - pf(l-1)$

- 1) find all decreasing points  
 array  $\underline{if} [a[i] > a[i-1]] \rightarrow i$   $\underline{f}(n)$
- 2) pf sum  $\underline{O(n)}$
- 3)  $\underline{q} = pf[r] - pf[l]$   $\underline{O(1)}$
- Yes  $\leftarrow$   $pf[r] - pf[l]$   $\rightarrow O$   
 No
- T.C:  $\underline{O(n+q)}$   
 S.C:  $\underline{O(n)}$   
Space const



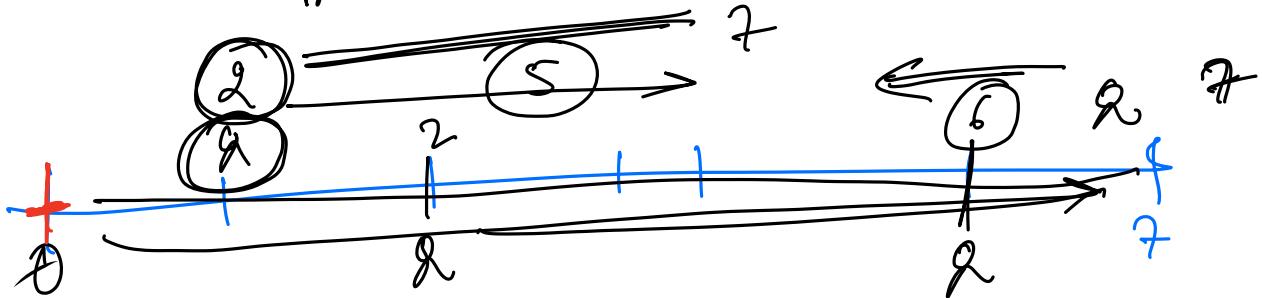
Time at which the last ant just fell off =





$\Delta s = \text{max distance cover by any ab}$

$\max (n - \text{location of first at min in } n, \text{last} - 0)$



$$7 - 2 = 5$$

$$7 - 1 - 0 = 6$$

