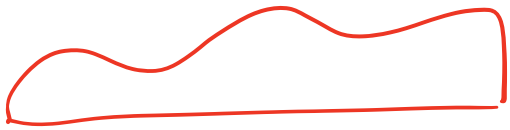
Q Given 2 sorted Array A & B → {DISTINCT}

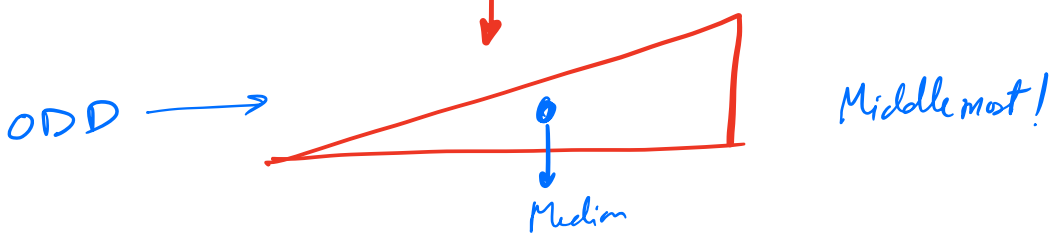
N M

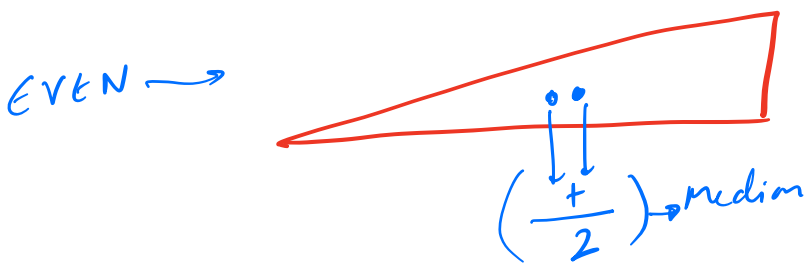
N+M is ODD

find the median of {A, B}

Median:







A: 4 5 3 1 6

↓ SORT

1 3 4 5 6 → Median: 4

A: 4 5 3 1 6 2

↓ SORT

1 2 3 4 5 6 → 3+4/2 = 3.5 ✓

A: 2 6 11 15 27 N: 5

B: 1 10 13 25 M: 4

Sorted {A,B} : 1, 2, 6, 10, 11, 13, 15, 25, 27

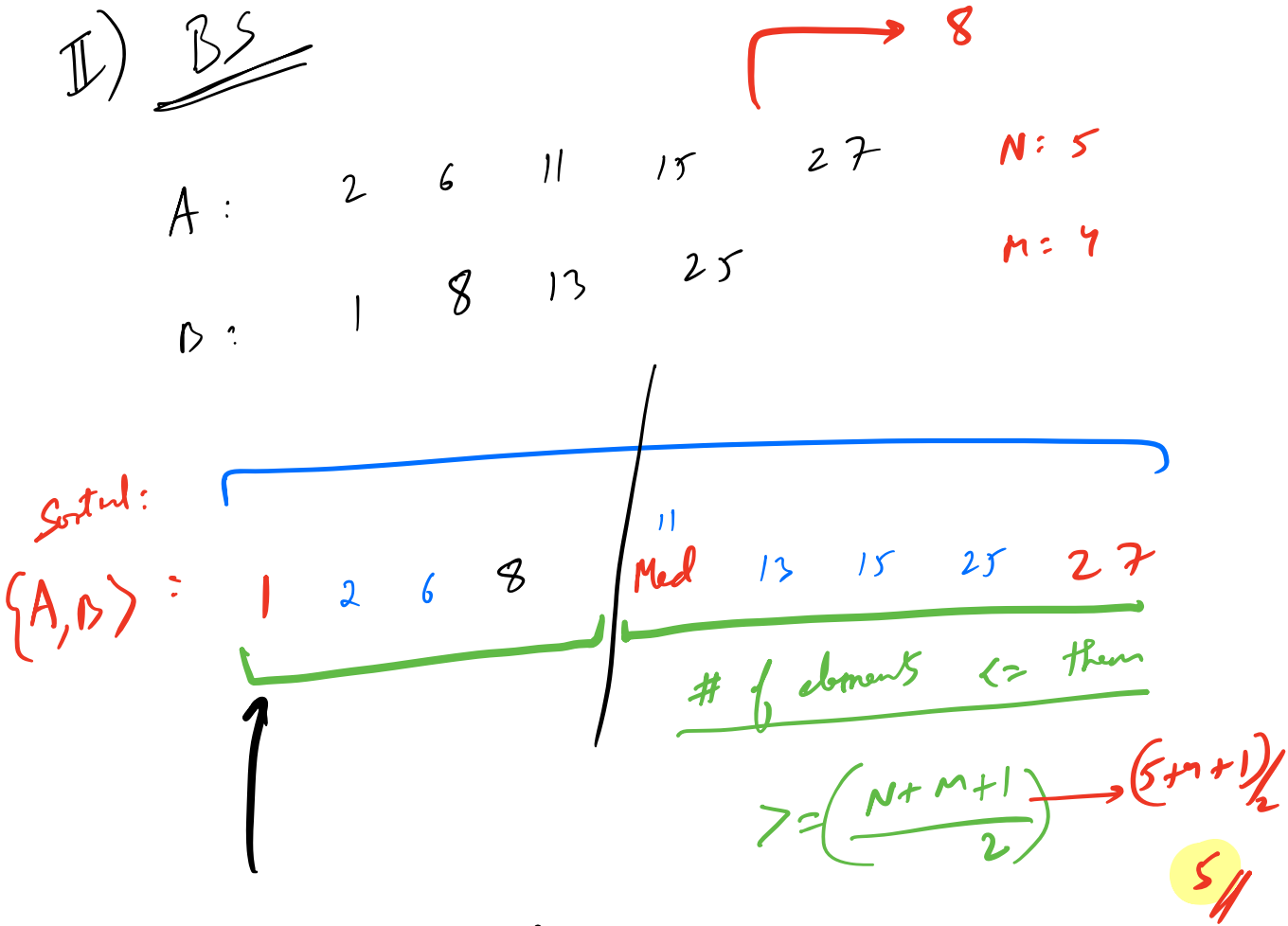
Median ({A,B}) → 11

I) Merge 2 sorted Arrays.

TC: O(N+M)

SC: O(N+M) → O(1)

II) BS




```
l = min( A[0], B[0]);
h = max( A[N-1], B[M-1]);
ans = -1;
while( l <= h) {
    m = (l+h)/2;
    if ( LE(A[], m) + LE( B[], m) >= (N+M+1)/2)
        ans = m; h = m-1;
    }
    else {
        l = m+1;
    }
```

log(N) + log(M)

BS: log(NM)

log(N)

log(M)

}

ret any;

$R \rightarrow Max(A,B) - Min(A,B)$

it $\rightarrow \log(R)$

TC: $O(\log(R) \cdot \log(NM))$

Q Given A & B. Find LCM(A, B).

8 : 8, 16, 24, 32 — —

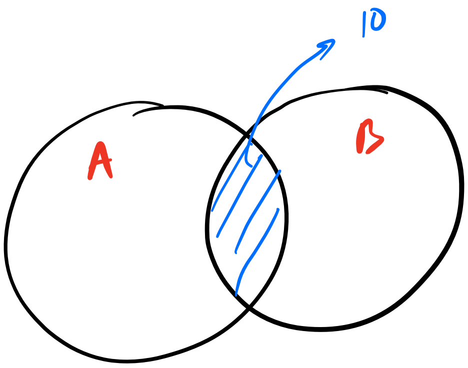
12 : 12, 24, 36 ———

$A \times B = LCM(A,B) \times GCD(A,B)$

$$LCM(A,B) = \frac{A \times B}{GCD(A,B)}$$

$\log(\min(A,B))$

Q Venn Diagram



A : Cricket : 30

B : fb : 40

Either Crick or fb or both

$$A \cup B = A + B - A \cap B$$

$30 + 40 - 10$

$= 60$

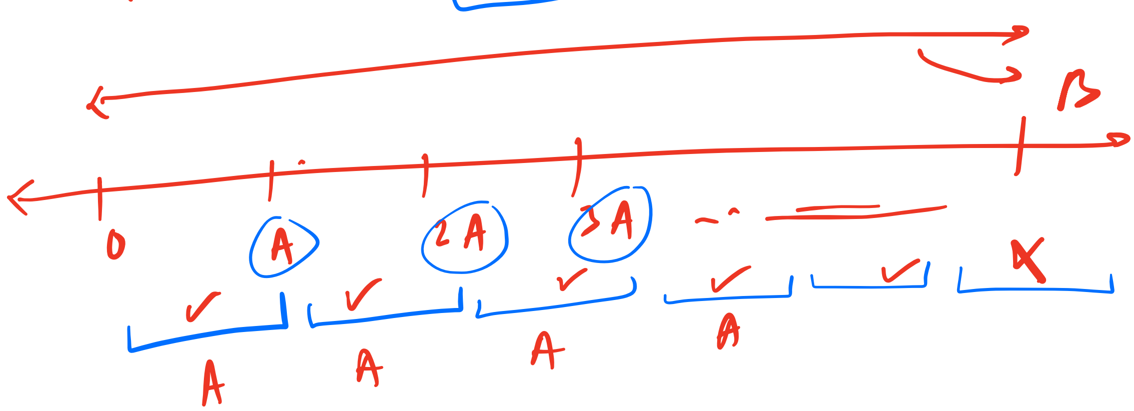
Q find the # of multiples of A in [1 − B]

$= B/A$

A	B
3	20

3, 6, 9, 12, 15, 18

$20/3 = B/A$



Q: Given A, B & C. find the # of multiples of B or C in [1, A].

A	B	C
35	3	5

×3: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33

×5: 5, 10, 15, 20, 25, 30, 35

LCM: 15

11 + 7 − 2

# of multiples of B or C in [1, A] = 16

= # of mult. of B in [1, A]
+ # ——— C ———
− # of mult. of LCM(B, C) in [1, A]

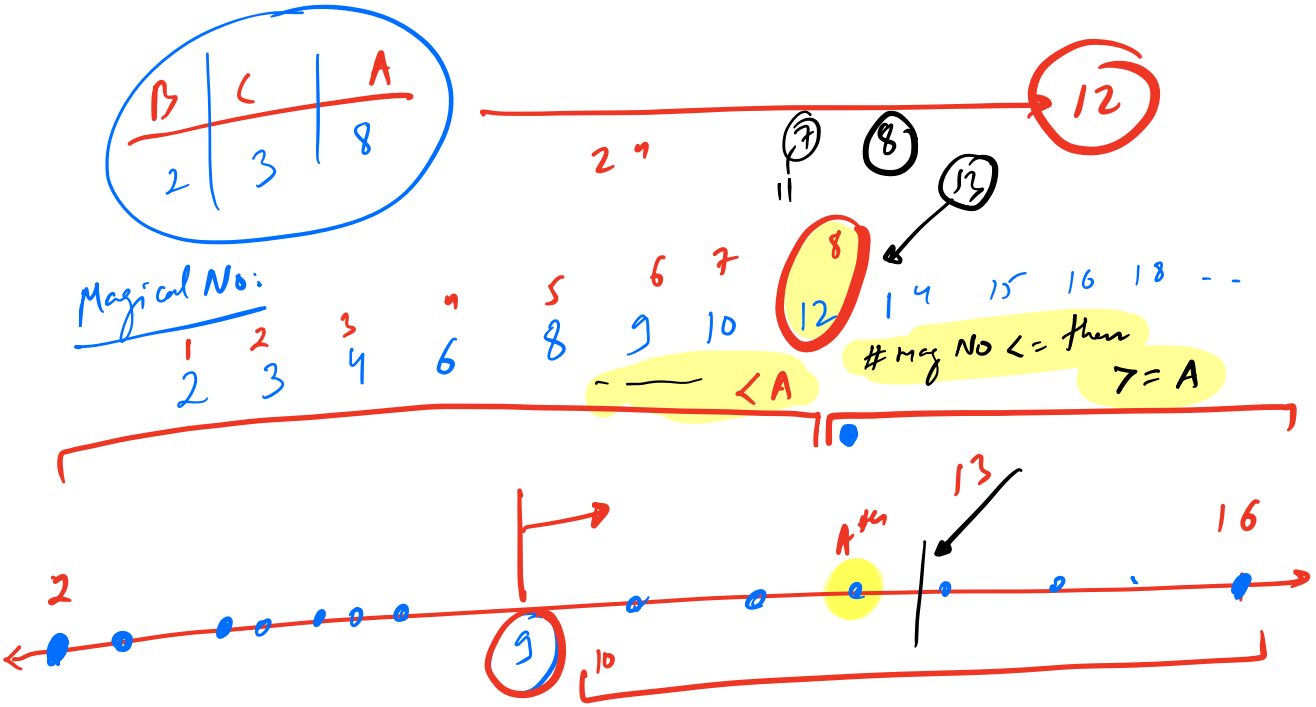
$$= A/B + A/C - A/LCM(B,C)$$

L — A^{th} Magical No.

Given A, B, C. Find the A^{th} magical no.

A multiple of B or C

B	C	A
2	3	8



$9/2 + 9/3 - 9/6 =$

$13/2 + 13/3 - 13/6$

8

L

$\min(B, C)$

H

$\min(B, C) \times A$

```
l = min(B,C)
h = l x A                    LCM → LCM(B,C)
ans = -1;
while( l <= h) {
    m = (l+h)/2 ;
    if ( m/B + m/C - m/LCM >= A) {
        ans = m;
        h = m-1;
    }
    else {
        l = m+1;
    }
}
out ans;
```

$R = \min(B,C) \times A - \mathrm{LCM}(B,C)$

#it → $\log(R)$

$TC = O(\log(R))$

Q Given N tasks, time taken to finish each task & K workers.

Find the min time in which all tasks can be completed!

- A single worker can only do continuous set of tasks
- All workers start at the same time.
- A single task → A single worker.

K = 3

Eg: 3 5 1 7 8 2 5 3 10 1 4 7 5 7 6

w1 → 24

w2 → 37

w3 → 10

37

K = 3

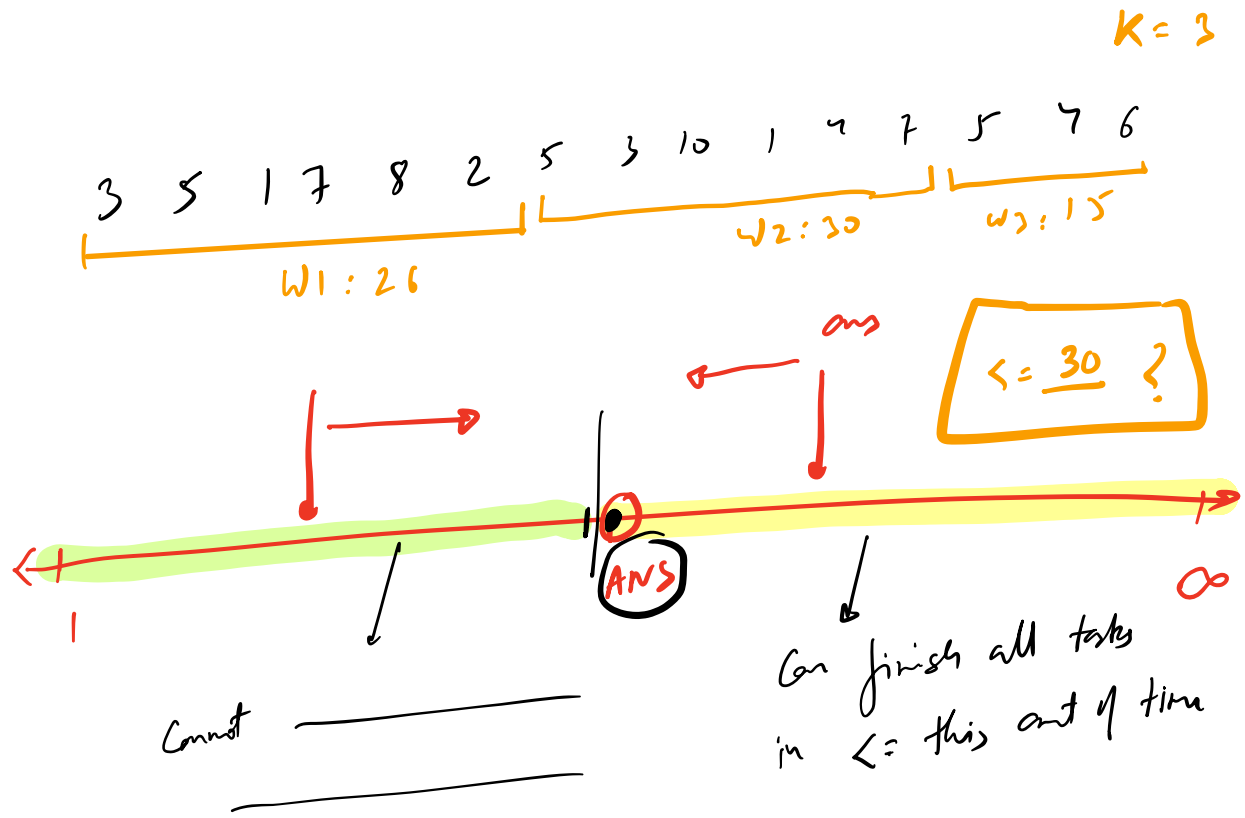
3 5 1 7 8 2 5 3 10 1 4 7 5 7 6

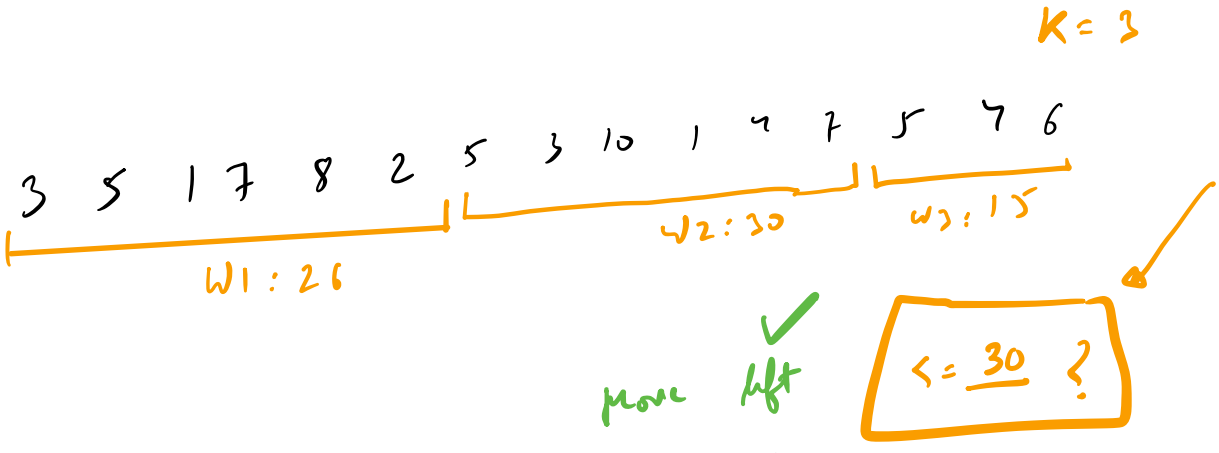
w1 → 24

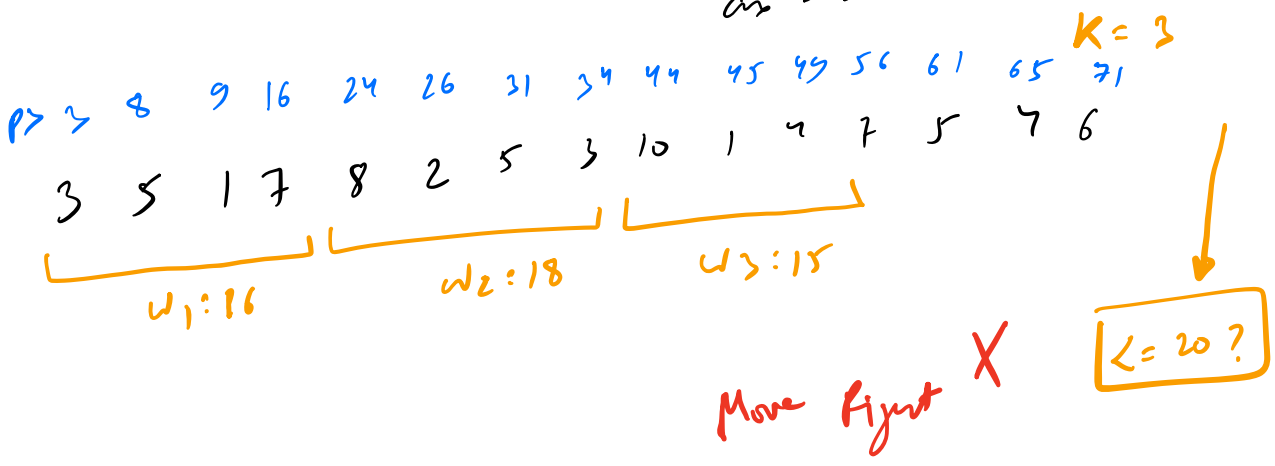
w2 → 20

w3 → 27

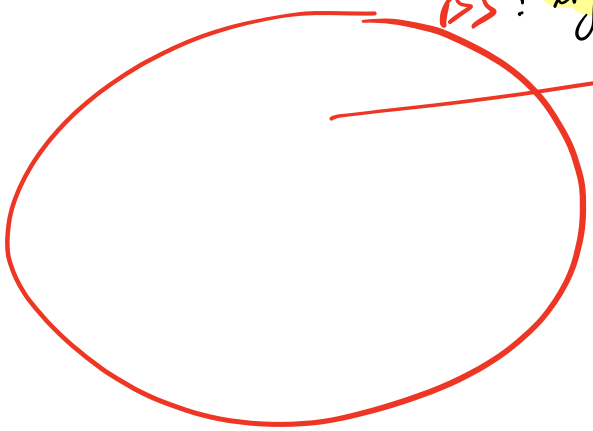
27


K = 3
3 5 1 7 8 2 5 3 10 1 4 7 5 7 6
W1 : 26
W2 : 30
W3 : 15
ans
<= 30 ?
ANS
1
∞
Cannot
Can finish all tasks in <= this amt of time


K = 3
3 5 1 7 8 2 5 3 10 1 4 7 5 7 6
W1 : 26
W2 : 30
W3 : 15
<= 30 ?
move left
ans = 30


K = 3
P> 3 8 9 16 24 26 31 34 44 45 49 56 61 65 71
3 5 1 7 8 2 5 3 10 1 4 7 5 7 6
W1 : 16
W2 : 18
W3 : 15
<= 20 ?
Move Right

$l = \max(A)$ | $h = \text{SUM}(A)$



BS : $\log(\text{sum}(A) - \max(A))$ × check : $O(N)$

OR

BS : $O(K \cdot \lg N)$

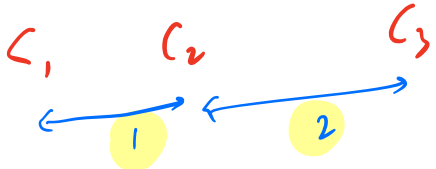
Q Given N cows & M stalls (x-axis) at DISTINCT locations.

Place all N cows in such a way that MIN dist b/w any 2 cows is MAXIMIZED!

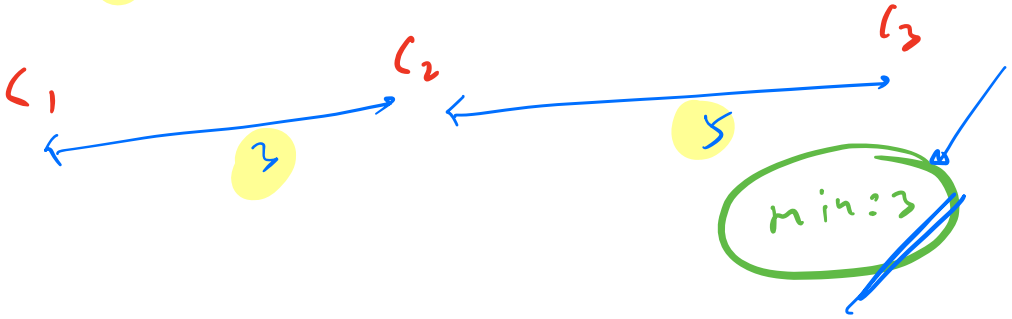
1 stall → 1 cow / 0 cow $N <= M$

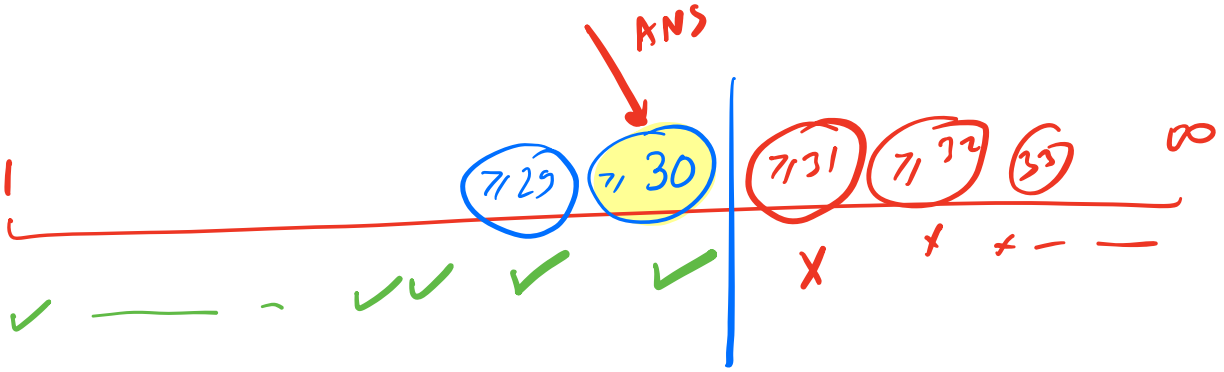
Stalls : 1 2 4 8 9

C=3



MIN : 1



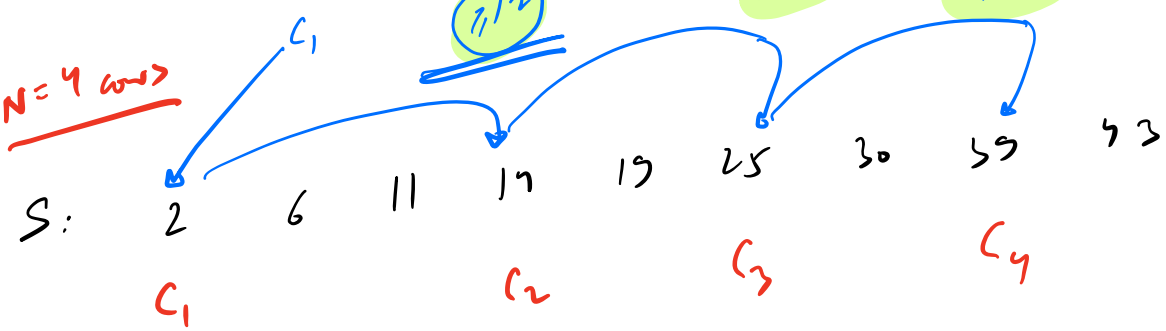


N = 4 cows

S: 2 6 11 14 19 25 30 50 93

C_1 C_2 C_3

// 15 X move left



// 10 ✓ ans = 10 move right

check() → O(M)

BS: N. log(M)