Binary Search

Agenda

1. Allocate Min number of pages
2. Aggressive cows
3. Capacity to Ship Packages within D days
4. Minimum Limit of Balls in a Bag

Allocate Minimum number of pages.

Books[] = {34, 12, 67, 90} Stud = 2

Requirements

- distribute these N Books among these M students.
- such that each stud should get min one book.
- distribution should be in contegueous manner.

min no. of max pages read by a stud.

Books[] = { 34, 12, 67, 90 } Stud = 2

way 1

S1 → 34 + 12 + 67 → 113

S2 → 90 → 90

way 2

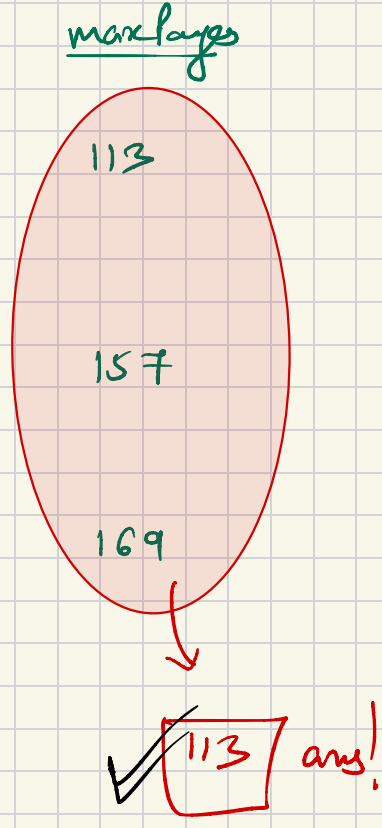
S1 → 34 + 12 → 46

S2 → 67 + 90 → 157

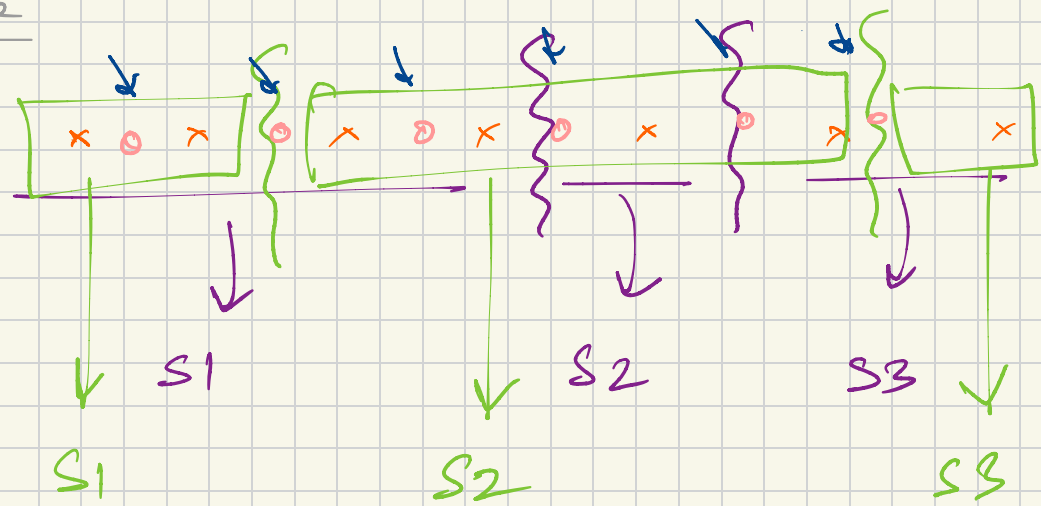
way 3

S1 → 34 → 34

S2 → 12 + 67 + 90 → 169



Brute Force



clear

3 students

N → Books

M → students

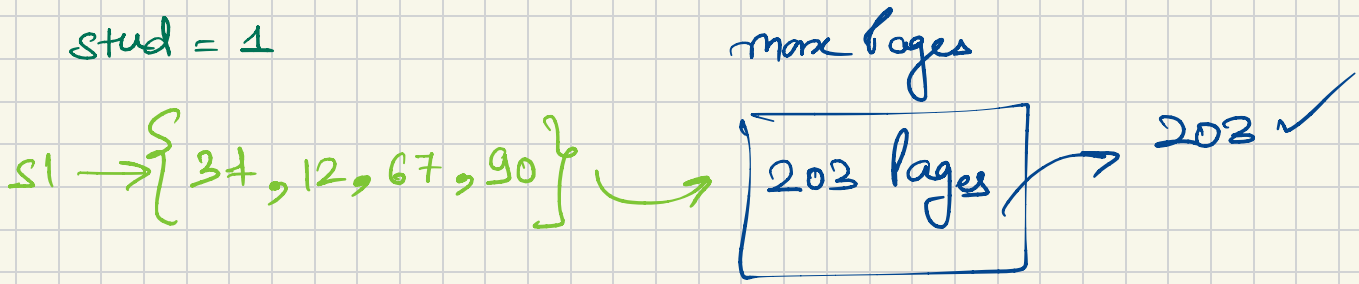
you have to place (M-1) dividers

recursion

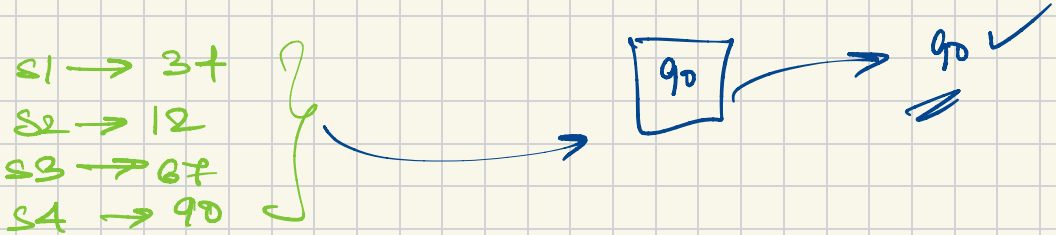
(N-1) pos 2 options place a divider or not, $T = 2^{N-1} \times (M-1)$

Books[] = {34, 12, 67, 90} stud = 2

Case1 stud = 1



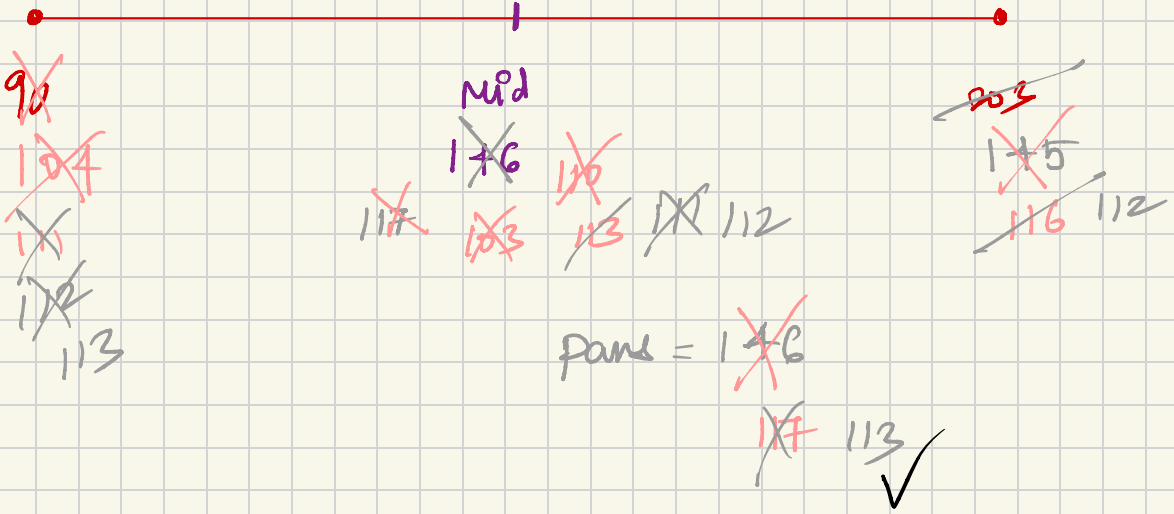
Case2 stud = 4



always

$1 \leq M \leq N$ ✓

Stud = 2



Books[] = {37, 12, 67, 90}

Max^m Pages = 146

S1 → 37 + 12 + 67 }
S2 → 90 }

Books[] = {37, 12, 67, 90}

Max^m Pages = 117

S1 → 37 + 12 + 67 }
S2 → 90 }

Books[] = { 34, 12, 67, 90 }

Maximum Pages = 103

S1 → 34 + 12

S2 → 67

S3 → 90

Books[] = { 34, 12, 67, 90 }

Maximum Pages = 110

S1 → 34 + 12

S2 → 67

S3 → 90

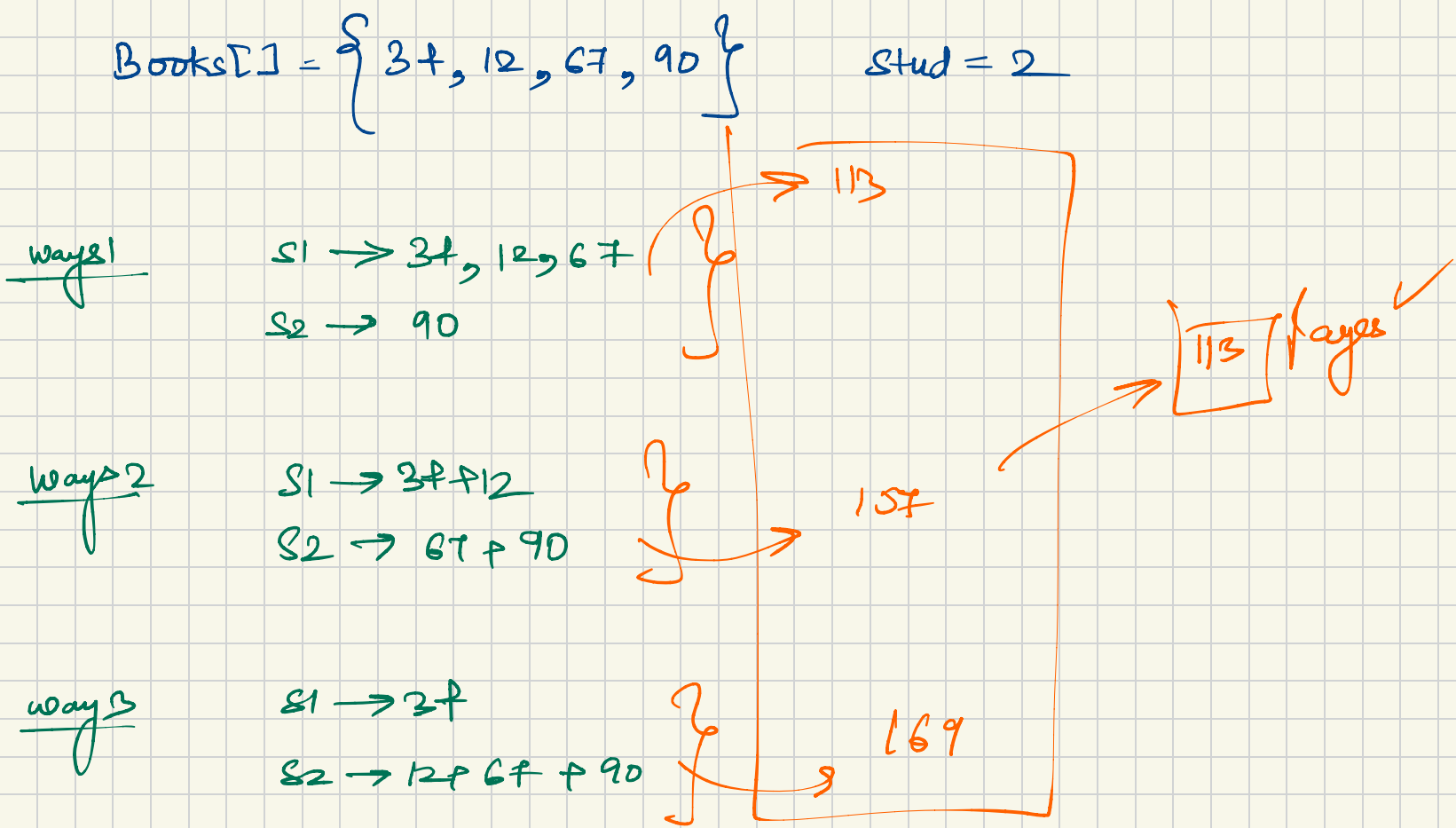
Books[] = {34, 12, 67, 90}

S1 → 34 + 12 + 67

S2 → 90

Maximum Pages = 113

Books[] = { 37, 12, 67, 90 } stud = 2

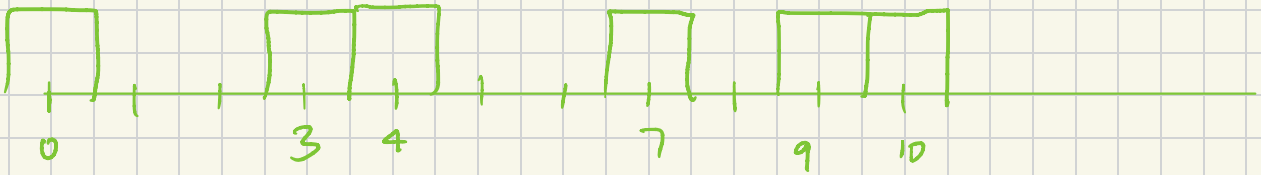


Aggressive cows

stalls[] = {0, 3, 7, 9, 10, 4}

cows = 4

aggressive =

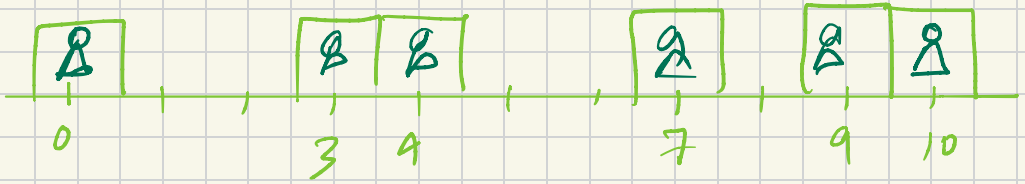


ques?

✓ max^m the min dist b/w any two cows

✓ ${}^6C_4$ ways to distribute

Stalls



Case 1. cows = 2

dist = 10

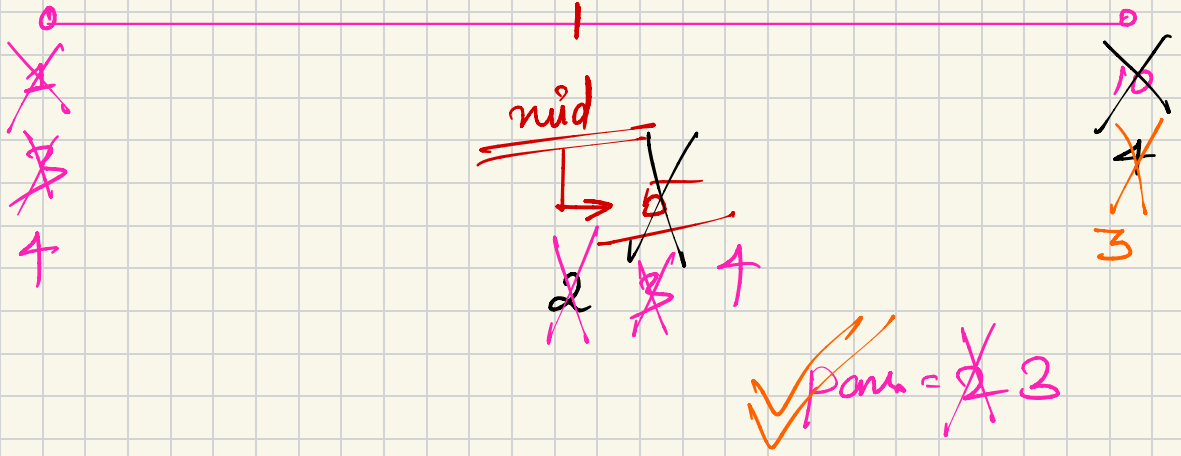
Case 2 cows = N → No. of stalls

dist = 1

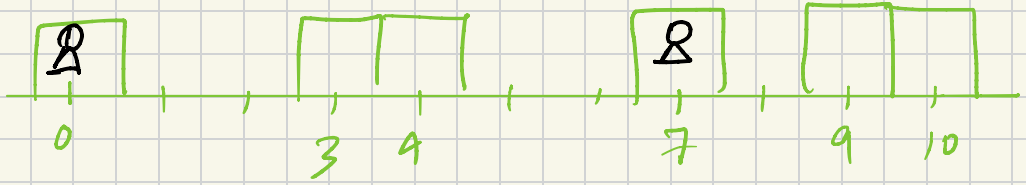
$2 \leq cows \leq N$

$cows = 4$

maximize



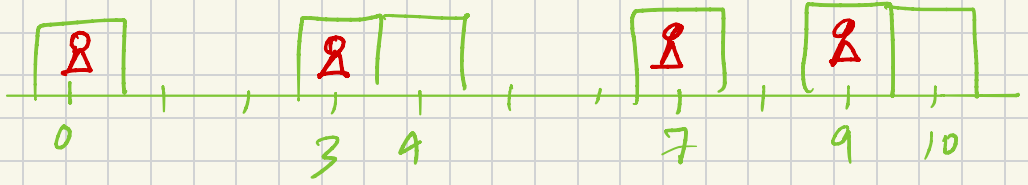
Stalls



minDist = 5

cows = 2

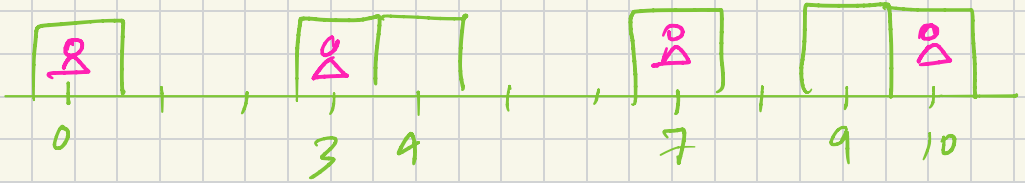
Stalls



minDist = 2

cows = 4

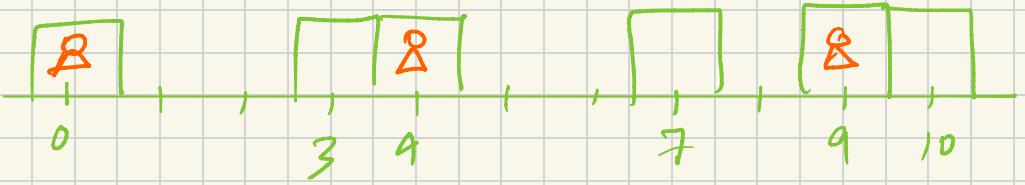
Stalls



minDist = 3

cows = 4

Stalls



minDist = 4

cows = 3