08/02/2026
Sunday

Allocate Books

Given an array
a[i] represents no of pages in the ith book
There are m no of stds the task is to allocate the all books to the students
Allocate books in such a way

1. Each student gets atleast one book
2. Each book should be allocated to only one student
3. Book allocation should be in contigous manner if not possible return -1

Gist we need to find min(max)

Given
$a = [25 \quad 46 \quad 28 \quad 49 \quad 24]$

(m) stds = 4

I know one thing. if no of books are less than the students then it is not possible.

Suppose
Std 1 - 25
Std 2 - 46
" 3 - 28
4 - 49
5 - 24 but we need to assign all to m stds only

1 - 25

2 - 25 — we cannot add bcuz of cond^n 2

1 - 25 3rd cond^n

2 - 46 should be in contigous

1 - 25+46

2 - 28

3 - 49

4 - 24

1 way 25, 46 | 28 | 49 | 24 71

2 way 25 | 46+28 | 49 | 24 74

3 way 25 | 46 | 49+28 | 24 77

4 way 25 | 46 | 28 | 49+24 73

we need to find min(max)

among all this min is 71

take another example

[25 46 28 49 24]

if only 1 stdt then I can allocate all books so

max is sum(a)

high is sum(a)

and Low is max(a)

I have to max pages book rgt

low	mid	high
49	$\left(\frac{172+49}{2}\right)$ 110	172

110

for 110 I will find how many stds I can get

std 1 — 25+46+28 <110

std 2 — 49+24 <110

only 2 stds but we need 4/stds m

So we should go left side

high = mid - 1

low	mid	high
49	$\left(\frac{49+99}{2}\right)$ 74	99

Now I will check for 74

std 1 — 25+46

std 2 — 28+49

std 3 — 49+24

} I got 3

but we need 4 right so we go left side high = mid - 1

low	mid	high
49	$\left(\frac{49+73}{2}\right)$ 61	73

for 61

std 1 → 25

std 2 → 46

std 3 → 28

std 4 → 49

std 5 → 24

we got 5 students

but we need 4 students only

so we go to right side only

low = mid + 1

low = 62, high = 73

$mid = \left(\frac{62+73}{2}\right) = \frac{135}{2} = 67$

for 67

Stdt 1 → 25

Stdt 2 → 46

Stdt 3 → 28

Stdt 4 → 49

Stdt 5 → 24

still 5 students we need 4 students only so we go right side

low = mid + 1

low = 68, high = 73

$mid = \left(\frac{68+73}{2}\right) = \frac{141}{2} = 70$

70

Stdt 1 → 25

Stdt 2 → 46

Stdt 3 → 28

Stdt 4 → 49

Stdt 5 → 24

so 5 stdts so we go to right side

low = mid + 1

low = 71, mid = (71+73)/2 = 72, high = 73

For 72

stdt 1 – 25+46

stdt 2 – 28

stdt 3 – 49

stdt 4 – 24

we got 4 students but we need min right so we go left side

high = mid - 1

low = 71, mid = 71, high = 71

For 71

stdt 1 → 25+46

stdt 2 → 28

stdt 3 → 49

stdt 4 → 24

we got 4 still we go rgt to Check any min these

but low crosses high

high = 70, low = 71

So answer is low

```
function countnostds(int[] a, int mid)
{
    stds = 1;
    noofpages = 0;
    for(int i=0; i<a.length; i++)
    {
        if(noofpages + a[i] <= mid)
        {
            noofpages += a[i];
        }
        else{
            stds += 1;
            noofpages = a[i];
        }
    }
    return stds;
}
public int solve(int[] a, int n, int m)
{
    int low = max(a,n);
    int high = sum(a,n);
    while(low <= high){
        int mid = low + (high-low)/2;
    int countstds = countnostds(a,mid);
        if(countstds <= m)
        {
            high = mid-1;
        }
        else{
            low = mid+1;
    }   }
```

return low;

}

painters partition

a = [10 20 30 40] K=2

given K painters
these painters should paint in contigous manner

10 units of area

Each painter should get atleast one unit to paint

for K=2

[10] [20 30 40] max is 90
P1 P2
10
90

[10 20] [30 40] max is 70
P1 P2
30
70

[10 20 30] [40] max is 60
P1 P2
40
60

among all this minimum is 60

Split array - Largest sum

↳ split the array into K subarrays such that the max subarray sum is minimum

it is also same as painters partition

Book's allocation

painter's partition

split array - Largest sum

least capacity to ship within D days

all these are following same approach