Competitive Programming

Lec 13

Greedy Algorithms

Bhavik Dhandhalya

Greedy Algorithms

Going Pilani to Delhi.
There are several ways.

1. Walking
2. Car
3. Train
4. Flight

Minimum cost solution if I want to reach within 6 hour ?

That is greedy problem.
And whatever answer is optimal solution for our problem.

Greedy Algorithms

- Stock buy/sell

Greedy : **maximum** profit

- Topper from class

Greedy : **maximum** marks

Before an Exam, Codeforces

Tomorrow Peter has a Biology exam. He does not like this subject much, but d days ago he learnt that he would have to take this exam. Peter's strict parents made him prepare for the exam immediately, for this purpose he has to study not less than minTimei and not more than maxTimei hours per each i-th day. Moreover, they warned Peter that a day before the exam they would check how he has followed their instructions.

So, today is the day when Peter's parents ask him to show the timetable of his preparatory studies. But the boy has counted only the sum of hours sumTime spent him on preparation, and now he wants to know if he can show his parents a timetable schedule with d numbers, where each number schedulei stands for the time in hours spent by Peter each i-th day on biology studies, and satisfying the limitations imposed by his parents, and at the same time the sum total of all schedulei should equal to sumTime.

Solution

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Before an Exam, Codeforces

Input

The first input line contains two integer numbers d, sumTime ($1 \le d \le 30, 0 \le sumTime \le 240$) — the amount of days, during which Peter studied, and the total amount of hours, spent on preparation. Each of the following d lines contains two integer numbers minTimei, maxTimei ($0 \le minTimei \le maxTimei \le 8$), separated by a space — minimum and maximum amount of hours that Peter could spent in the i-th day.

Output

In the first line print YES, and in the second line print d numbers (separated by a space), each of the numbers — amount of hours, spent by Peter on preparation in the corresponding day, if he followed his parents' instructions; or print NO in the unique line. If there are many solutions, print any of them.

Solution

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Before an Exam, Codeforces

Examples
Input
1 48
5 7

output
NO

Input
2 5
0 1
3 5

output
YES
1 4

Solution

Assign Mice to Holes, Amazon

There are N Mice and N holes are placed in a straight line.
Each hole can accommodate only 1 mouse.
A mouse can stay at his position, move one step right from x to x + 1, or move one step left from x to x − 1. Any of these moves consumes 1 minute.
Assign mice to holes so that the time when the last mouse gets inside a hole is minimized.

positions of mice are:
4 -4 2
positions of holes are:
4 0 5

answer = 4.

You are given two Array,
A = position of mice
B = position of holes

Solution

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Solution

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Cinema Line

The new "Die Hard" movie has just been released! There are n people at the cinema box office standing in a huge line. Each of them has a single 100, 50 or 25 ruble bill. A "Die Hard" ticket costs 25 rubles. Can the booking clerk sell a ticket to each person and give the change if he initially has no money and sells the tickets strictly in the order people follow in the line?

input4 25 25 50 50 Output YES	input 2 25 100 output NO	input 4 50 50 25 25 output NO

Solution

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Bulbs, Interviewbit

N light bulbs are connected by a wire.

Each bulb has a switch associated with it, however due to faulty wiring, a switch also changes the state of all the bulbs to the right of current bulb.

Given an initial state of all bulbs, find the minimum number of switches you have to press to turn on all the bulbs.

You can press the same switch multiple times.

Note : 0 represents the bulb is off and 1 represents the bulb is on.

Solution

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Bulbs, Interviewbit

Input 1:
A = [1]
Output 1:
0

There is no need to turn any switches as all the bulbs are already on.

Input 2:
A = [0 1 0 1]
Output 2:

4

press switch 0 : [1 0 1 0]
press switch 1 : [1 1 0 1]
press switch 2 : [1 1 1 0]
press switch 3 : [1 1 1 1]

Gas Station, Google

Given two integer arrays A and B of size N.
There are N gas stations along a circular route, where the amount of gas at station i is A[i].

You have a car with an unlimited gas tank and it costs B[i] of gas to travel from station i
to its next station (i+1). You begin the journey with an empty tank at one of the gas stations.

Return the minimum starting gas station's index if you can travel around the circuit once, otherwise return -1.

You can only travel in one direction. i to i+1, i+2, ... n-1, 0, 1, 2..
Completing the circuit means starting at i and
ending up at i again.

Solution

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Gas Station, Google

Input:
gas = [1,2,3,4,5]
cost = [3,4,5,1,2]

Output:
_____

Input:
gas = [2,3,4]
cost = [3,4,3]

Output:
_____

Gas Station, Google

Input:
gas = [1,2,3,4,5]
cost = [3,4,5,1,2]

Output:
3

Input:
gas = [2,3,4]
cost = [3,4,3]

Output:
-1

Homework

Sale	Easy, Codeforces
Highest Product	Try to get AC in 1 go
Distribute Candy	Easy, Amazon, Microsoft, Flipkart
Magic Numbers	Easy, Codeforces
Table Decorations	Easy, Codeforces