Assignment #6

Sorting/Binary Search Tree
Problem 1. Street Lamps

Score: 40 points

Due: Dec 11, 2020

There is a long straight road in the middle of SKKU campus. The road is illuminated by N street lamps. Each street lamp illuminates its surrounding left and right areas with a different brightness. More formally, the lamp i at location x_i with the brightness b_i illuminates the area from $x_i - b_i$ to $x_i + b_i$ of the road.

The university is trying to lower the electricity bill by removing useless street lamps to reduce power consumption. If the area covered by one street lamp is included in the area of another street lamp, the street lamp is considered useless. In other words, A street lamp i is useless if there exists another street lamp j that satisfies $x_j - b_j \leq x_i - b_i$ and $x_i + b_i \leq x_j + b_j$.

Write a program to find all useless street lamps for given street lamp information.

Input

The first line contains a single integer N ($1 \leq N \leq 500,000$) — the number of street lamps.

Each of the next N lines contains two integers each, the i-th line conatins x_i ($1 \leq x_i \leq 10^8$) and b_i ($1 \leq b_i \leq 10^8$) — the location and brightness of the lamp i.

It is guaranteed that no two lamps are installed on the same location.

Output

In the first line, print a single integer m — the number of street lamps after removing uselsess lamps.

In the second line, print m number of unremoved lamps in ascending order of location.

Sample Inputs

Sample Input 1	Sample Output 1
6 5 2 18 1 3 2 12 4 9 3 10 8	3 3 6 2

Sample Input 2	Sample Output 2
4 7 4 1 3 26 1 15 7	4 2 1 4 3

Grading Policy

Submissions will be graded based on the number of test cases passed. There are execution time and memory limitations, so be sure to write efficient code. Submit your code on goormEDU (`https://skku.goorm.io`).

For late submission, grades will be deducted by 25% per late day. That is, after 4 days, the grade will be zero.

The assignment should be done by yourself. We use plagiarism detection tool on all submissions.

If you have any questions, leave them in the spreadsheet or send an email to the TA. Please do not use i-Campus message. (TA Youngjae Lee: `yjlee4154@gmail.com`)

Q&A Spreadsheet Link
`https://docs.google.com/spreadsheets/d/1RDbEqFMS1FUO-KHcqX3BvhMHNJI0Y-wpOPXAmE-zdQU/edit?usp=sharing`