

Problem A. Game

Input file: standard input
Output file: standard output
Time limit: 1 second
Memory limit: 64 megabytes

Two players – the First and the Second - play on the rectangular table sized $a \times b$. The players in turns try to put a coin on the table, so that it is completely lying on the table without intercepting with other coins. The player who cannot finish his turn, i.e. put the coin, loses. Unlimited amount of coins are available, all of them are rectangular and have the same size $c \times d$.

Find out who will win this game, if both players play optimally, and you know that the First starts.

Input

The only line of input contains four integer numbers a , b , c and d , separated by spaces. All numbers are integers. $0 < a, b, c, d \leq 10^3$.

Output

In the only line of output print **First**, if the First player wins, or **Second**, if the Second wins.

Example

standard input	standard output
1 1 2 1	Second
80 67 20 85	First

Problem B. Fraction

Input file: standard input
Output file: standard output
Time limit: 1 second
Memory limit: 64 megabytes

You are given four natural numbers a , b , c , d . You should find such natural numbers x and y , that $\frac{a}{b} < \frac{x}{y} < \frac{c}{d}$. If multiple answers exists, output one with the minimum y . If still more than one answer exists, choose one with the minimum x .

Input

Input file contains n tests, $1 \leq n \leq 50\,000$. The first line of the input contains integer n . Each next n lines contains four numbers separated by spaces a , b , c , d , $1 \leq a, b, c, d \leq 1\,000\,000\,000$.

Output

Output file should contain n lines — answers to each test in corresponding order of the input file. Each line should contain numbers x and y separated by spaces.

Example

standard input	standard output
2	1 2
1 3 2 3	3 1
2 1 4 1	

Problem C. Triwizard Tournament

Input file: standard input
Output file: standard output
Time limit: 12 seconds
Memory limit: 256 megabytes

Harry Potter participates in the Triwizard Tournament. In its final round the contestants have to go through a labyrinth filled with traps and obstacles. The labyrinth is built in such a way that only brave and noble wizards can get out of it.

The labyrinth consist of N rooms, numbered 1 through N . The room are connected with magical passages. All rooms react to the aura of a wizard currently in the room, and rebuild themselves correspondingly. A wizard's aura can be colored with one of M possible colors at each moment of time. When a wizard enters a room, the room observes his aura color and shows him some solitary magical passage from this room to some other one, depending on the observed color. All passages are magical, so a passage can lead to any other labyrinth room, including the one that originated the passage.

Before a contestant enters the labyrinth, he is charmed with the Personality Revelation Spell. This spell holds for an indefinite time period. While it holds, it changes the wizard's aura color each time the wizard has to pass from one room to another. It is impossible to predict how exactly the colors will change, and how many times will the spell affect the wizard's aura color – both the spell duration and the color change pattern depend only on the wizard's moral qualities. However, some durations/color change patterns are known to happen only if the wizard is brave and noble. Only such wizards should find an exit from the labyrinth.

The labyrinth has one entrance (room $\#S$) and F exits. The Tournament organizers built the labyrinth in such a way that the only wizards who can find an exit are those whose aura color changes according to the "brave and noble" pattern. In other words, at a moment when the spell stops working, a wizard stands at an exit if and only if he is brave and noble.

Nobody knows that lord Voldemort and his minions plan to turn each labyrinth exit into a portal and kidnap Harry. They want to rebuild the labyrinth in a way that would be the easiest for Harry to pass. Harry's bravery and nobility are beyond doubts, so the labyrinth structure has to remain the same (the only wizards able to pass it are those who would be able to pass the original labyrinth). However, the deception may be uncovered at any moment, so Harry has to pass the labyrinth as soon as possible. That is, the labyrinth has to be rebuilt as compactly as possible.

You are given the original labyrinth, built by Tournament organizers. You are to rebuild it, minimizing the number of labyrinth rooms, and preserving its structure: the only wizards able to pass the new labyrinth should be those and only those who were able to pass the original labyrinth.

Input

The first line contains the number of labyrinth rooms N ($1 \leq N \leq 1000$) and the number of possible aura colors M ($1 \leq M \leq 30$). All possible aura colors are numbered 1 through M .

The next line contains the entrance room index S ($1 \leq S \leq N$) and the number of exits F ($1 \leq F \leq N$). F numbers follow in the same line, which denote the indexes of exit rooms.

The next N lines contain M numbers each. i^{th} line among these N lines describes the behavior of the room $\#i$ when a wizard enters it. If the wizard's aura is colored with a color $\#j$ ($1 \leq j \leq M$), then he will have access only to the passage that leads to the room a_{ij} , where a_{ij} is the j^{th} number in the i^{th} line.

All numbers in the input are separated by spaces.

Output

Output the description of the rebuilt labyrinth with the minimal number of rooms. Your description should follow the same format as in the input. If multiple rebuilding options are possible, output any of

them.

Examples

standard input	standard output
4 3	2 3
1 1 4	1 1 2
2 2 4	1 1 2
3 3 4	2 2 2
3 3 4	
4 4 4	

Explanation

In the example the labyrinth is passable only by those wizards, whose aura was colored with the color #3 at least once while the spell was working.

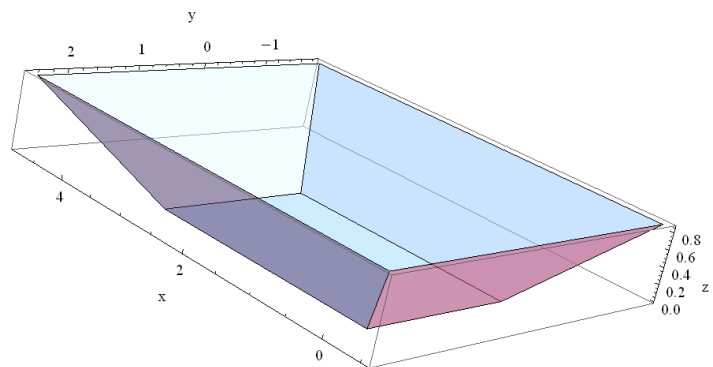
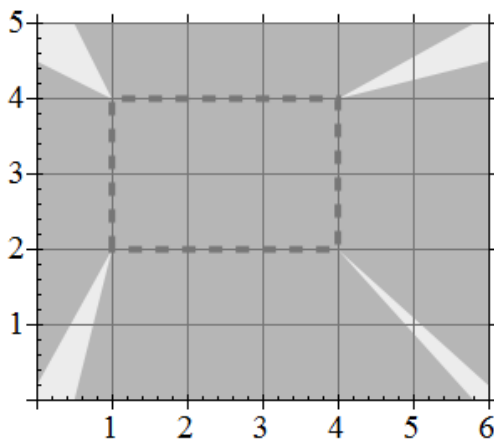
Problem D. Trough

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 64 megabytes

Farmer Alexander urgently needs to produce a large trough for piglets bathing. For this purpose he has a rectangular sheet of tin measuring $A \times B$.

Trough's top and bottom must be rectangular (parallel one to one). To make a trough, you have to cut out 4 segments from the corners, bend the "walls" and weld the corner edges of the trough. (see pictures)

Write a program to determine the maximum possible volume of trough made from the fixed sized sheet of tin.



Input

The first line of the input contains integer: n , number of tests in input file $1 \leq n \leq 25$. Next n lines contains two space separated numbers each: metal plate sizes A and B , $1 \leq A \leq 10$, $1 \leq B \leq 10$.

Output

The output should contain n lines answers to each test correspondingly. Line number j should contain exactly one number — maximum possible volume of water tank made from given metal plate with precision at least 10^{-6} .

Example

standard input	standard output
2	0.366746
2.3 1.2	20.394871
7.3 5.3	

Problem E. Nu, pogodi! (Well, Just You Wait)

Input file: standard input
Output file: standard output
Time limit: 2 second
Memory limit: 64 megabytes

Many of you could remember an old game "Nu, pogodi!" ("Well, Just You Wait") made under soviet brand name "Electronika". You face the same problem in this task: to collect falling eggs so that none of them will break. N number of eggs falls from the sky. We know time t_i and coordinates x_i, y_i of falling for each i egg, all the pairs (x_i, y_i) are different. We have to minimize the number of wolves needed to collect all the eggs. All wolves (you can have an unlimited number of them) move with the same constant speed, covering one unit of distance for one unit of time. We consider that the wolf has caught an egg, if he was in a point of its falling at the right time. With a minimum number of wolves we also have to minimize the total distance they are going to run. The wolves can start at any point, and their way to start points does not account into total distance.

Input

The first line of input file contains $N, 0 \leq N \leq 100$. The next N lines contain three numbers each — t_i, x_i, y_i , where $0 \leq t_i \leq 10^9, 0 \leq x_i \leq 10^6, 0 \leq y_i \leq 10^6$, — time and coordinates of egg number i . All numbers in the input are integers.

Output

In the only line of output file, print two numbers separated by spaces: the minimum number of wolves and minimum total distance they will run with precision 10^{-3} .

Example

standard input	standard output
4 1 1 1 4 2 3 6 3 2 6 4 1	2 3.650282

Problem F. Divisors

Input file: standard input
Output file: standard output
Time limit: 1 second
Memory limit: 64 megabytes

You are given set of natural numbers. You should check whether this set matches with a set of all divisors of some natural number. For example, set $\{1, 2, 3, 6\}$ matches with a set of all divisors of number 6. But set $\{1, 2, 3, 4, 5\}$ doesn't match with a set of all divisors for any natural number.

Input

The first line of input file contains integer n — quantity of numbers in the given set, $1 \leq n \leq 200\,000$. Second line contains n natural numbers separated by spaces— the contents of the set. All numbers in the second line are different and do not exceed 10^{18} .

Output

In the only line of output file print **yes** if the answer is yes, or **no** if the answer is no.

Example

standard input	standard output
4 3 6 1 2	yes
5 1 5 4 3 2	no

Problem G. Socks

Input file: standard input
Output file: standard output
Time limit: 8 seconds
Memory limit: 8 megabytes

Vasya has some different types of socks. He knows that he has even number of socks of each type, except two types, for which number of socks is odd one. Help Vasya find those two types. Socks types are numerated as natural numbers.

Please note memory limits for this task.

Input

The first line of the input contains natural number n — the total number of socks Vasya has, $2 \leq n \leq 10\,000\,000$. The second line contains n integer numbers separated by spaces — types of Vasya's socks. Each socks' type in absolute value does not exceed $1\,000\,000\,000$.

Output

In the only line of the output print two numbers separated by spaces — types of socks Vasya is looking for. Numbers in the output should be in ascending order. It is guaranteed that input data is correct and answer always exists.

Example

standard input	standard output
6 4 8 4 7 9 9	7 8
8 7 7 7 5 5 5 5 6	6 7

Problem H. Splitting of the telephone number

Input file: standard input
Output file: standard output
Time limit: 1 second
Memory limit: 64 megabytes

It is usual to put hyphens between some figures in telephone numbers. For examples, the number 1245633 may be written as 124-56-33 or 12-45-633. We can consider the parts as numbers and count their sum. In partial, for the splitting 124-56-33 this sum is equal to $124 + 56 + 33 = 213$. It is interesting to find the splitting of the given number into k parts with the minimal sum.

Input

The unique line of the input contains a telephone number n , consisting of the figures from 0 to 9. The number n contains from 1 to 300 figures. After a space the natural number k is situated. This number denotes the quantity of the parts, into which it is needed to split n . It is no more than the quantity of the figures in n .

Output

Output the minimal possible sum of k parts, into which we can split n

Example

standard input	standard output
1245633 3	213
00000000000000000000000012 4	3

Explanation

In the first example the best splitting is 124-56-33. In the second one we may choose, for example, 00000-0000000000-00000001-2.