ESEA - Assignment #2 - Java

Problem 1:

City X consists of n vertical and n horizontal infinite roads, forming n × n intersections. Roads (both vertical and horizontal) are numbered from 1 to n, and the intersections are indicated by the numbers of the roads that form them. Sand roads have long been recognized out of date, so the decision was made to asphalt them.

To do this, a team of workers was hired and a schedule of work was made, according to which the intersections should be asphalted.

Road repairs are planned for n^2 days. On the i-th day of the team arrives at the i-th intersection in the list and if none of the two roads that form the intersection were already asphalted they asphalt both roads. Otherwise, the team leaves the intersection, without doing anything with the roads.

According to the schedule of road works tell in which days at least one road will be asphalted.

Input

The first line contains integer n (1 ≤ n ≤ 50) — the number of vertical and horizontal roads in the city.

Next n^2 lines contain the order of intersections in the schedule. The i-th of them contains two numbers hi, vi (1 ≤ hi, vi ≤ n), separated by a space, and meaning that the intersection that goes i-th in the timetable is at the intersection of the hi-th horizontal and vi-th vertical roads. It is guaranteed that all the intersections in the timetable are distinct.

Output

In the single line print the numbers of the days when road works will be in progress in ascending order. The days are numbered starting from 1.

input
2
1 1
1 2
2 1
2 2
output
1 4

input
1
1 1
output
1

Note

In the sample the brigade acts like that:

- On the first day the brigade comes to the intersection of the 1-st horizontal and the 1-st vertical road. As none of them has been asphalted, the workers asphalt the 1-st vertical and the 1-st horizontal road;
- On the second day the brigade of the workers comes to the intersection of the 1-st horizontal and the 2-nd vertical road. The 2-nd vertical road hasn't been asphalted, but as the 1-st horizontal road has been asphalted on the first day, the workers leave and do not asphalt anything;

- On the third day the brigade of the workers come to the intersection of the 2-nd horizontal and the 1-st vertical road. The 2-nd horizontal road hasn't been asphalted but as the 1-st vertical road has been asphalted on the first day, the workers leave and do not asphalt anything;
- On the fourth day the brigade come to the intersection formed by the intersection of the 2-nd horizontal and 2-nd vertical road. As none of them has been asphalted, the workers asphalt the 2-nd vertical and the 2-nd horizontal road.

Problem 2:

Our friend likes programming contests. He especially likes to rate his students on the contests he prepares. Now, he has decided to prepare a new contest. In total, n students will attend, and before the start, every one of them has some positive integer rating. Students are indexed from 1 to n. Let's denote the rating of i-th student as ai. After the contest ends, every student will end up with some positive integer position. GukiZ expects that his students will take places according to their ratings.

He thinks that each student will take place equal to . In particular, if student A has rating strictly lower then student B, A will get the strictly better position than B, and if two students have equal ratings, they will share the same position. Our friend would like you to reconstruct the results by following his expectations. Help him and determine the position after the end of the contest for each of his students if everything goes as expected.

Input

The first line contains integer n ($1 \le n \le 2000$), number of Our friend's students. The second line contains n numbers $a_1, a_2, \ldots a_n$ ($1 \le a_i \le 2000$) where a_i is the rating of i-th student ($1 \le i \le n$).

Output

In a single line, print the position after the end of the contest for each of n students in the same order as they appear in the input.

input
3
1 3 3
output
3 1 1

input
1
1
output
1

input
5
3 5 3 4 5
output
4 1 4 3 1

Note

- In the first sample, students 2 and 3 are positioned first (there is no other student with higher rating), and student 1 is positioned third since there are two students with higher rating.
- In the second sample, first student is the only one on the contest.
- In the third sample, students 2 and 5 share the first position with highest rating, student 4 is next with third position, and students 1 and 3 are the last sharing fourth position.

Problem 3:

Our friend decided to give Our friend a pair of flowers from the garden. There are n flowers in the garden and the i-th of them has a beauty number bi. Our friend is a very strange girl so she doesn't want to have the two most beautiful flowers necessarily.

She wants to have those pairs of flowers that their beauty difference is maximal possible! Your task is to write a program which calculates two things:

The maximum beauty difference of flowers that Our friend can give to Our friend.

The number of ways that Our friend can pick the flowers. Two ways are considered different if and only if there is at least one flower that is chosen in the first way and not chosen in the second way.

Input

The first line of the input contains n (2 ≤ n ≤ 2*10^5). In the next line there are n space-separated integers b1, b2, ..., bn (1 ≤ bi ≤ 109).

Output

The only line of output should contain two integers. The maximum beauty difference and the number of ways this may happen, respectively.

input
2
1 2
output
1 1

input
3
1 4 5
output
4 1

input
5
3 1 2 3 1
output
2 4

Note

In the third sample the maximum beauty difference is 2 and there are 4 ways to do this:

choosing the first and the second flowers;

choosing the first and the fifth flowers;

choosing the fourth and the second flowers;

choosing the fourth and the fifth flowers.

Problem 4:

A magic island Geraldion, where Our friend lives, has its own currency system. It uses banknotes of several values. But the problem is, the system is not perfect and sometimes it happens that Geraldionians cannot express a certain sum of money with any set of banknotes. Of course, they can use any number of banknotes of each value. Such sum is called unfortunate. Gerald wondered: what is the minimum unfortunate sum?

Input

The first line contains number n ($1 \le n \le 1000$) — the number of values of the banknotes that used in Geraldion.

The second line contains n distinct space-separated numbers a1, a2, ..., an ($1 \le ai \le 10^6$) — the values of the banknotes.

Output

Print a single line — the minimum unfortunate sum. If there are no unfortunate sums, print - 1.

input
5
1 2 3 4 5
output
-1

Problem 5:

Today, Wet Shark is given n integers. Using any of these integers no more than once, Wet Shark wants to get maximum possible even (divisible by 2) sum. Please, calculate this value for Wet Shark.

Note, that if Wet Shark uses no integers from the n integers, the sum is an even integer 0.

Input

The first line of the input contains one integer, n ($1 \le n \le 100\,000$). The next line contains n space separated integers given to Wet Shark. Each of these integers is in range from 1 to 10^9, inclusive.

Output

Print the maximum possible even sum that can be obtained if we use some of the given integers.

input
3
1 2 3
output
6
input
5
999999999 999999999 999999999 999999999 999999999
output
3999999996

Note

In the first sample, we can simply take all three integers for a total sum of 6.

In the second sample Wet Shark should take any four out of five integers 999 999 999.

Problem 6:

It is lunch time for Mole. His friend, Marmot, prepared him a nice game for lunch. Marmot brought Mole n ordered piles of worms such that i-th pile contains ai worms. He labeled all these worms with consecutive integers: worms in first pile are labeled with numbers 1 to a1, worms in second pile are labeled with numbers a1 + 1 to a1 + a2 and so on.

See the example for a better understanding.

Mole can't eat all the worms (Marmot brought a lot) and, as we all know, Mole is blind, so Marmot tells him the labels of the best juicy worms. Marmot will only give Mole a worm if Mole says correctly in which pile this worm is contained. Poor Mole asks for your help. For all juicy worms said by Marmot, tell Mole the correct answers.

Input

The first line contains a single integer n (1 ≤ n ≤ 10^5), the number of piles.

The second line contains n integers a1, a2, ..., an (1 ≤ ai ≤ 10^3, a1 + a2 + ... + an ≤ 10^6), where ai is the number of worms in the i-th pile.

The third line contains single integer m (1 ≤ m ≤ 10^5), the number of juicy worms said by Marmot.

The fourth line contains m integers q1, q2, ..., qm ($1 \le qi \le a1 + a2 + ... + an$), the labels of the juicy worms.

Output

Print m lines to the standard output. The i-th line should contain an integer, representing the number of the pile where the worm labeled with the number qi is.

input
5
2 7 3 4 9
3
1 25 11
output
1
5
3

Note

For the sample input:

The worms with labels from [1, 2] are in the first pile.

The worms with labels from [3, 9] are in the second pile.

The worms with labels from [10, 12] are in the third pile.

The worms with labels from [13, 16] are in the fourth pile.

The worms with labels from [17, 25] are in the fifth pile.

Problem 7:

Amr is a young coder who likes music a lot. He always wanted to learn how to play music but he was busy coding so he got an idea. Amr has n instruments, it takes ai days to learn i-th instrument. Being busy, Amr dedicated k days to learn how to play the maximum possible number of instruments. Amr asked for your help to distribute his free days between instruments so that he can achieve his goal.

Input

The first line contains two numbers n, k ($1 \le n \le 100$, $0 \le k \le 10\,000$), the number of instruments and number of days respectively.

The second line contains n integers ai ($1 \le ai \le 100$), representing number of days required to learn the i-th instrument.

Output

In the first line output one integer m representing the maximum number of instruments Amr can learn.

In the second line output m space-separated integers: the indices of instruments to be learnt. You may output indices in any order.

if there are multiple optimal solutions output any. It is not necessary to use all days for studying.

input
4 10
4 3 1 2
output
4
1 2 3 4

input
5 6
4 3 1 1 2
output
3
1 3 4

input
1 3
4
output
0

Note

In the first test Amr can learn all 4 instruments.

In the second test other possible solutions are: {2, 3, 5} or {3, 4, 5}.

In the third test Amr doesn't have enough time to learn the only presented instrument.

Problem 8:

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?

Input

The first line contains integer n (1 ≤ n ≤ 105) — the number of people in the line. The next line contains n integers, each of them equals 25, 50 or 100 — the values of the bills the people have. The numbers are given in the order from the beginning of the line (at the box office) to the end of the line.

Output

Print "YES" (without the quotes) if the booking clerk can sell a ticket to each person and give the change. Otherwise print "NO".

input
4
25 25 50 50
output
YES

input
2
25 100
output
NO

input
4
50 50 25 25
output
NO

Problem 9:

Our friend wants to turn on Christmas lights consisting of m bulbs. Initially, all bulbs are turned off. There are n buttons, each of them is connected to some set of bulbs. Our friend can press any of these buttons. When the button is pressed, it turns on all the bulbs it's connected to. Can Our friend light up all the bulbs?

If Our friend presses the button such that some bulbs connected to it are already turned on, they do not change their state, i.e. remain turned on.

Input

The first line of the input contains integers n and m ($1 \leq n, m \leq 100$) — the number of buttons and the number of bulbs respectively.

Each of the next n lines contains x_i ($0 \leq x_i \leq m$) — the number of bulbs that are turned on by the i-th button, and then x_i numbers y_{ij} ($1 \leq y_{ij} \leq m$) — the numbers of these bulbs.

Output

If it's possible to turn on all m bulbs print "YES", otherwise print "NO".

input
3 4
2 1 4
3 1 3 1
1 2
output
YES

input
3 3
1 1
1 2
1 1
output
NO

Note

In the first sample you can press each button once and turn on all the bulbs.

In the 2 sample it is impossible to turn on the 3-rd lamp.

Problem 10:

Mishka is a little polar bear. As known, little bears loves spending their free time playing dice for chocolates. Once in a wonderful sunny morning, walking around blocks of ice, Mishka met her friend Chris, and they started playing the game. Rules of the game are very simple: at first number of rounds n is defined. In every round each of the players throws a cubical dice with distinct numbers from 1 to 6 written on its faces. Player, whose value after throwing the dice is greater, wins the round. In case if player dice values are equal, no one of them is a winner. In average, player, who won most of the rounds, is the winner of the game. In case if two players won the same number of rounds, the result of the game is draw. Mishka is still very little and can't count wins and losses, so she asked you to watch their game and determine its result. Please help her!

Input

The first line of the input contains single integer n n ($1 \le n \le 100$) — the number of game rounds.

The next n lines contains rounds description. i-th of them contains pair of integers mi and ci ($1 \le mi, ci \le 6$) — values on dice upper face after Mishka's and Chris' throws in i-th round respectively.

Output

If Mishka is the winner of the game, print "Mishka" (without quotes) in the only line. If Chris is the winner of the game, print "Chris" (without quotes) in the only line. If the result of the game is draw, print "Friendship is magic!^^" (without quotes) in the only line.

input
3
3 5
2 1
4 2
output
Mishka

input
2
6 1
1 6
output
Friendship is magic!^^

input
3
1 5
3 3
2 2
output
Chris

Note

In the first sample case Mishka loses the first round, but wins second and third rounds and thus she is the winner of the game.

In the second sample case Mishka wins the first round, Chris wins the second round, and the game ends with draw with score 1:1.

In the third sample case Chris wins the first round, but there is no winner of the next two rounds. The winner of the game is Chris.

Problem 11:

In the popular spreadsheets systems (for example, in Excel) the following numeration of columns is used. The first column has number A, the second — number B, etc. till column 26 that is marked by Z. Then there are two-letter numbers: column 27 has number AA, 28 — AB, column 52 is marked by AZ. After ZZ there follow three-letter numbers, etc.

The rows are marked by integer numbers starting with 1. The cell name is the concatenation of the column and the row numbers. For example, BC23 is the name for the cell that is in column 55, row 23.

Sometimes another numeration system is used: RXCY, where X and Y are integer numbers, showing the column and the row numbers respectfully. For instance, R23C55 is the cell from the previous example.
Your task is to write a program that reads the given sequence of cell coordinates and produce each item written according to the rules of another numeration system.

Input
The first line of the input contains integer number n ($1 \leq n \leq 10^5$), the number of coordinates in the test. Then there follow n lines, each of them contains coordinates. All the coordinates are correct, there are no cells with the column and/or the row numbers larger than 10^6 .

Output
Write n lines, each line should contain a cell coordinates in the other numeration system.

input
2
R23C55
BC23
output
BC23
R23C55

Problem 12:

We know that prime numbers are positive integers that have exactly two distinct positive divisors. Similarly, we'll call a positive integer t T-prime, if t has exactly three distinct positive divisors.

You are given an array of n positive integers. For each of them determine whether it is T-prime or not.

Input

The first line contains a single positive integer, n (1 ≤ n ≤ 105), showing how many numbers are in the array. The next line contains n space-separated integers xi (1 ≤ xi ≤ 1012).

Output

Print n lines: the i-th line should contain "YES" (without the quotes), if number xi is T-prime, and "NO" (without the quotes), if it isn't.

input
3
4 5 6
output
YES
NO
NO

Note

The given test has three numbers. The first number 4 has exactly three divisors — 1, 2 and 4, thus the answer for this number is "YES". The second number 5 has two divisors (1 and 5), and the third number 6 has four divisors (1, 2, 3, 6), hence the answer for them is "NO".

Problem 13:

Toastman came up with a very easy task. He gives it to Appleman, but Appleman doesn't know how to solve it. Can you help him?

Given a $n \times n$ checkerboard. Each cell of the board has either character 'x', or character 'o'. Is it true that each cell of the board has even number of adjacent cells with 'o'? Two cells of the board are adjacent if they share a side.

Input

The first line contains an integer n ($1 \le n \le 100$). Then n lines follow containing the description of the checkerboard. Each of them contains n characters (either 'x' or 'o') without spaces.

Output

Print "YES" or "NO" (without the quotes) depending on the answer to the problem.

input
3
xxo
xox
oxx
output
YES

input
4
xxxo
xoxo
oxox
xxxx
output
NO

Problem 14:

After their adventure with the magic mirror Kay and Gerda have returned home and sometimes give free ice cream to kids in the summer.
At the start of the day they have x ice cream packs. Since the ice cream is free, people start standing in the queue before Kay and Gerda's house even in the night. Each person in the queue wants either to take several ice cream packs for himself and his friends or to give several ice cream packs to Kay and Gerda (carriers that bring ice cream have to stand in the same queue).
If a carrier with d ice cream packs comes to the house, then Kay and Gerda take all his packs. If a child who wants to take d ice cream packs comes to the house, then Kay and Gerda will give him d packs if they have enough ice

cream, otherwise the child will get no ice cream at all and will leave in distress. Kay wants to find the amount of ice cream they will have after all people will leave from the queue, and Gerda wants to find the number of distressed kids.

Input

The first line contains two space-separated integers n and x (1 ≤ n ≤ 1000, 0 ≤ x ≤ 10^9).

Each of the next n lines contains a character '+' or '-', and an integer di, separated by a space (1 ≤ di ≤ 109). Record "+ di" in i-th line means that a carrier with di ice cream packs occupies i-th place from the start of the queue, and record "- di" means that a child who wants to take di packs stands in i-th place.

Output

Print two space-separated integers — number of ice cream packs left after all operations, and number of kids that left the house in distress.

input

```
5 7
+ 5
- 10
- 20
+ 40
- 20
```

output

```
22 1
```

input
5 17
- 16
- 2
- 98
+ 100
- 98
output
3 2

Note
Consider the first sample.

Initially Kay and Gerda have 7 packs of ice cream.
Carrier brings 5 more, so now they have 12 packs.
A kid asks for 10 packs and receives them. There are only 2 packs remaining.
Another kid asks for 20 packs. Kay and Gerda do not have them, so the kid goes away distressed.
Carrier bring 40 packs, now Kay and Gerda have 42 packs.
Kid asks for 20 packs and receives them. There are 22 packs remaining.

Problem 15:

Vanya loves playing. He even has a special set of cards to play with. Each card has a single integer. The number on the card can be positive, negative and can even be equal to zero. The only limit is, the number on each card doesn't exceed x in the absolute value. Natasha doesn't like when Vanya spends a long time playing, so she hid all of his cards. Vanya became sad and started looking for the cards but he only found n of them. Vanya loves the balance, so he wants the sum of all numbers on found cards equal to zero. On the other hand, he got very tired of looking for cards. Help the boy and say what is the minimum number of cards does he need to find to make the sum equal to zero?

You can assume that initially Vanya had infinitely many cards with each integer number from - x to x.

Input

The first line contains two integers: n ($1 \le n \le 1000$) — the number of found cards and x ($1 \le x \le 1000$) — the maximum absolute value of the number on a card. The second line contains n space-separated integers — the numbers on found cards. It is guaranteed that the numbers do not exceed x in their absolute value.

Output

Print a single number — the answer to the problem.

input
3 2
-1 1 2
output
1
input
2 3
-2 -2
output
2

Note

In the first sample, Vanya needs to find a single card with number -2.

In the second sample, Vanya needs to find two cards with number 2. He can't find a single card with the required number as the numbers on the lost cards do not exceed 3 in their absolute value.