

Problem A. Secret Object X-0619

Input file: `standard input`
Output file: `standard output`
Time limit: 1 second
Memory limit: 256 megabytes

The secret object *X-0619* is located on a rectangular area with dimensions $H \times W$ meters.

To set up video surveillance of the object's territory, it was decided to use special drones. Each of these drones can be configured to monitor a **square** area of arbitrary size and location. Every point on the object's territory must be within the surveillance range of at least one drone. Due to the possibility of other secret objects being located near the secret object *X-0619*, no point outside the object's territory should fall within the surveillance range of any drone.

Determine the minimum number of drones required for this.

Input

The input consists of a single line containing two integers H and W ($1 \leq H, W \leq 1000$) - the length and width of the secret object.

Output

Output a single integer - the minimum number of drones required to monitor the object *X-0619*.

Examples

standard input	standard output
3 9	3
4 3	2

Problem B. We Love Even Numbers

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 256 megabytes

The jury really loves even numbers. Right now we have a number with n digits, but it could be odd. We need to fix this urgently! To do this, you are allowed to perform the following operation exactly once:

Take a consecutive set of digits in the number and sort them in non-decreasing order.

For example, using this operation on the number 5317 can yield the numbers 5137, 3517, and 1357. Please make the number even and make the jury happy!

Input

The first line contains an integer n ($1 \leq n \leq 10^3$) — the number of digits in the number.

The second line contains an integer with n digits. This number does not contain any zeros.

Output

If you cannot make the jury happy, print «NO».

Otherwise, in the first line, print «YES». In the second line, print two integers L, R ($1 \leq L \leq R \leq n$) — the boundaries of the subsegment on which you performed the operation. In the third line, print the number obtained after the operation.

If there are multiple possible answers, you can print any of them.

Examples

standard input	standard output
5 43153	NO
6 654321	YES 1 6 123456

Problem C. Alternating Generator

Input file: standard input
Output file: standard output
Time limit: 1 second
Memory limit: 256 megabytes

Bystroszczyot Algebrovic wanted to come up with a method for generating numbers, so he created an algorithm that takes a positive integer x and generates the result according to the following scheme:

1. Reduce the current number x to $x - 1$
2. Double the current number x to $2 \cdot x$

All steps of the algorithm should **alternate**, meaning that the algorithm should work in the following order: $1, 2, 1, 2, \dots$. Additionally, the algorithm can start not from the first step, but from the second step, and should perform the steps in the following order: $2, 1, 2, 1, \dots$. For example, from the number 7, the algorithm can generate the numbers: $7 \rightarrow 14 \rightarrow 13 \rightarrow 26 \rightarrow \dots$ or the numbers $7 \rightarrow 6 \rightarrow 12 \rightarrow 11 \rightarrow \dots$.

Now Bystroszczyot wants to know, for a given number i , which numbers can generate the number i if the algorithm is started from them? More precisely, let's define the set B_i as all numbers from which the number i can be obtained after some (possibly zero) number of algorithm iterations, and let $|B_i|$ denote the quantity of numbers in the set B_i . The numbers in the set B_i will be called *generating* numbers for the number i . Bystroszczyot is interested in finding the total number of generating numbers for all integers from l to r , in other words, the value of $\sum_{i=l}^r |B_i|$. Help him calculate the answer!

Input

The input consists of a single line containing two integers l and r ($1 \leq l \leq r \leq 10^{18}$).

Output

Output a single integer — the answer to the problem.

Example

standard input	standard output
9 14	34

Problem D. Seating Arrangement for the Exam

Input file: **standard input**
Output file: **standard output**
Time limit: 2 seconds
Memory limit: 256 megabytes

An important exam is coming up, which will be taken by n students. All students will be seated in one classroom, which has n desks. Each student and desk is numbered from 1 to n . In total, the students will take m exams. You have been tasked with preparing a seating arrangement plan for each exam, satisfying the following conditions:

1. On any given day, all students must sit at different desks, meaning that exactly one desk should be assigned to each student.
2. Each time, the students must sit differently, meaning that there should not be two days where the seating arrangement plans are completely identical.
3. No student should sit at the same desk for consecutive exams.

The seating arrangement plan for one exam is represented by n integers $a_1, a_2, \dots, a_n$ ($1 \leq a_i \leq n$), which means that the 1st student should sit at desk a_1 , the 2nd student should sit at desk a_2 , and so on, until the n th student sits at desk a_n .

Input

The input consists of a single line containing two integers n and m ($1 \leq n, m \leq 10^3$).

Output

If it is not possible to satisfy the requirements, output «IMPOSSIBLE» on the first line. Otherwise, output «POSSIBLE» on the first line, followed by m lines, each containing n integers representing the seating arrangement for each exam.

Examples

standard input	standard output
6 3	POSSIBLE 1 2 3 4 5 6 6 5 4 3 2 1 1 3 2 5 6 4
4 30	IMPOSSIBLE

Problem E. Figure on the plane

Input file: standard input
Output file: standard output
Time limit: 1 second
Memory limit: 256 megabytes

There is no royal road to geometry

*Euclid's response to the Egyptian king who
asked for an easier way to study geometry*

Construct a convex hexagon on the plane with an area of S , where all coordinates are integers.

Input

In a single line, there is one integer S ($3 \leq S \leq 10^9$).

Output

Output twelve integers $x_1, y_1, x_2, y_2, \dots, x_6, y_6$ ($-10^9 \leq x_i, y_i \leq 10^9$) — the coordinates of the hexagon's vertices. Output the vertices in the order of traversing the figure clockwise or counterclockwise. All points must be different.

Example

standard input	standard output
22	3 7 5 8 8 5 6 2 3 3 2 5

Problem F. City Day of Izhevsk

Input file: `standard input`
Output file: `standard output`
Time limit: 1 second
Memory limit: 256 megabytes

On June 12th, the City Day of Izhevsk will be celebrated! In connection with the holiday, Izhevsk State Technical University (IzSTU or Istu) decided to hang a large sign saying "Izhevsk". To make it more beautiful and interesting, they decided to order several posters drawn in different styles. Each of them has a text written in such a way that when they are combined in a certain order, they form the word "Izhevsk".

Today, Hrisipp picked up the made posters from the store, and there were exactly three of them. Help him to connect them into one large poster.

Input

In a single line, three non-empty strings of Latin letters are given, separated by a single space. The length of each string does not exceed 5.

Output

In one line, output three words - the correct arrangement of the posters. Separate them with spaces.

Examples

standard input	standard output
I zh evsk	I zh evsk
he Iz vsk	Iz he vsk

Problem G. Square Sum on Segment

Input file: `standard input`
Output file: `standard output`
Time limit: 2 seconds
Memory limit: 256 megabytes

Consider a sequence of integers $a_1, a_2, \dots, a_n$. Define the function $g(x, y)$ as follows:

$$g(x, y) = a_x + 4a_{x+1} + 9a_{x+2} + \dots + (y - x + 1)^2 a_y$$

You are given q pairs of integers $l_1, r_1, \dots, l_q, r_q$. Calculate q values $g(l_1, r_1), g(l_2, r_2), \dots, g(l_q, r_q)$.

Input

The first line contains two integers n, q ($1 \leq n, q \leq 3 \cdot 10^5$).

The second line contains n integers $a_1, a_2, \dots, a_n$ ($-100 \leq a_i \leq 100$).

Then follow q lines. Each line contains two integers l_i, r_i ($1 \leq l_i \leq r_i \leq n$).

Output

Print q lines, each containing a single integer — the answer for the corresponding segment. Output the answers for segments l, r in the same order as they are given in the input.

Example

standard input	standard output
4 2	13
4 1 3 5	23
2 3	
3 4	

Problem H. Express Survey

Input file: `standard input`
Output file: `standard output`
Time limit: 1 second
Memory limit: 256 megabytes

At one of the programming olympiads, a survey was conducted by the organizers. The theme of the survey was programming language knowledge. Each respondent was given n answer choices to choose from, and they could choose as many options as they wanted. The last answer choice was "other" indicating that the respondent knows some programming languages that are not listed as options.

The results of the survey were compiled, specifically n numbers $a_1, a_2, \dots, a_n$. Exactly a_1 respondents chose the first option, exactly a_2 respondents chose the second option, and so on. Unfortunately, the number of people surveyed was not recorded in the results - their quantity was not fixed. However, now it is necessary to know at least an approximate number. You have been asked to determine, based on the available data, the minimum and maximum number of programmers who could have been surveyed to obtain such results. It can be assumed that each person chose at least one answer option (at the very least, they would choose the "other" option).

Input

The first line contains a single integer n ($1 \leq n \leq 5000$).

The second line contains n integers $a_1, a_2, \dots, a_n$ ($0 \leq a_i \leq 10^9$).

Output

Output two integers - the minimum and maximum, respectively.

Example

standard input	standard output
3 1 0 1	1 2

Problem I. GTA

Input file: `standard input`
Output file: `standard output`
Time limit: 1 second
Memory limit: 256 megabytes

Afanasiy recently came up with a great theorem, the Great Theorem of Afanasiy! So, the Great Theorem of Afanasiy (abbreviated as GTA) states that any number can be represented as the product of two non-negative numbers without trailing zeros.

Afanasiy asks you to verify if his theorem holds true for a given number n .

Input

You need to solve the problem independently for t different sets of input data.

The first line contains a single integer t ($1 \leq t \leq 10^5$) — the number of tests.

In each of the next t lines, there is a single integer n ($1 \leq n \leq 10^{18}$) — the value of n for each test.

Output

For each set of input data, output two integers a, b ($1 \leq a, b \leq n$) that satisfy the GTA for the number n .

If there are multiple valid answers, you can output any of them.

Example

standard input	standard output
2	11 5
55	5 8
40	

Problem J. Multiplied Permutation

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 256 megabytes

Danil, a well-known space traveler, decided to play the game "Caravan" with you. He wrote down the sequence $1, 2, 3, \dots, n$ (in that exact order) and then chose a subarray — two integers l, r ($1 \leq l \leq r \leq n$) and multiplied all the numbers with indices from l to r (inclusive) by a positive integer x . After that, all the numbers were randomly shuffled.

Your task is to figure out how Danil changed the permutation.

Input

The first line contains a single integer n ($1 \leq n \leq 2 \cdot 10^5$) — the length of the permutation.

The second line contains n integers $a_1, a_2, \dots, a_n$ ($1 \leq a_i \leq 10^{18}$) — the multiplied numbers.

Output

Output three integers l, r, x ($1 \leq l \leq r \leq n; 2 \leq x$) — the left boundary of the range, the right boundary of the range, and the scaling factor, respectively.

It is guaranteed that there is a valid answer. If there are multiple answers, you can output any of them.

Examples

standard input	standard output
8 6 8 8 6 1 10 7 2	3 5 2
5 3 5 1111111111111111 22222222222222 4	1 2 1111111111111111

Note

In the first example, the sequence $1, 2, 3, 4, 5, 6, 7, 8$ was transformed into $1, 2, 6, 8, 10, 6, 7, 8$ and after shuffling became $6, 8, 8, 6, 1, 10, 7, 2$.

Problem K. Drone Racing

Input file: **standard input**
Output file: **standard output**
Time limit: 2 seconds
Memory limit: 256 megabytes

n participants have already been invited to a new drone race. According to the organizers' plan, as soon as the race starts, each participant's drone will start moving from its starting position to its finishing position along a straight trajectory. The organizers have already determined the starting position for each participant.

Initially, it was also planned to select a separate finishing position for each participant individually. However, now, for the sake of a spectacular finale, the race organizers want to move the finishing positions of all participants to a single point. Of course, the distance between the starting and finishing positions for all participants must be the same. It is not possible to change the starting positions of the participants, but it is possible to change the race distance.

Help the organizers find such a distance and the common finishing position, or report that they do not exist.

Input

The first line contains a single integer n ($1 \leq n \leq 10^5$) - the number of race participants.

Then follows n lines, each containing two integers x_i, y_i ($-1000 \leq x_i, y_i \leq 1000$) - the starting position of the i -th race participant. Participants can start from the same points.

Output

If there is no suitable finishing position for all participants, print «NO».

Otherwise, print «YES». Then, on the second line, print three numbers x_e, y_e, d - the coordinates of the finishing position and the distance from the start to the finish.

If there are multiple possible answers, you can print any of them.

Your answer will be considered correct if the race distance for all participants is equal with an accuracy of 10^{-6} .

Example

standard input	standard output
2	YES
2 -1	2.000000 -3.000000 2.000000
4 -3	