

Problem A. A Story

Input file: standard input
Output file: standard output
Balloon Color: Red

Once upon a time in a world that looks like ours a story of a person who looks like many of us is about to begin and it unravels like a jigsaw puzzle. Make sure to open your eyes and focus, as things can look like a duplicated version of another person's story but soon you will know that it is exceptionally different than any other story you've experienced.

For it being a great harmonic and very imminent journey where paths may cross. Kudos to those who hone their knowledge and leverage their skills as marching into the future would definitely require them.

Moamen is starting his journey. He has two integers and needs to check if their summation is equal to their product.

Input

One line containing two integers A and B ($1 \leq A, B \leq 100$).

Output

Output "YES" (without quotes) if their summation is equal to their product, and "NO" (without quotes) otherwise.

Examples

standard input	standard output
2 2	YES
7 3	NO
1 7	NO

Problem B. Begins and it

Input file: standard input
Output file: standard output
Balloon Color: Black

Just like any story, it begins with an ambitious person, Noah. And as it moves forward, paths start to appear and connect. And as it takes two to Tango, Endure Capital, the ACPC Community Partner, believing in the relentless execution to build and achieve hyper-growth, starts investing in Noah's future journey.

Noah gives you an integer array A of length N , you are asked to do the minimum number of operations (possibly zero) to make the array good.

A good array is an array in which all elements are equal to zero.

The possible operations are:

- you can increase all elements in the array by one i.e., make $A_i = A_i + 1$ for all i from 1 to N
- decrease a subarray of a positive size of your choice by one.

Input

The first line contains one integer number $N(1 \leq N \leq 10^5)$.

The second line contains N integers $A_1, A_2, \dots, A_N(-10^8 \leq A_i \leq 10^8)$.

Output

The only output line should be the minimum number of operations to make the array good.

Examples

standard input	standard output
5 -2 0 5 7 1	11
10 0 1 0 2 0 3 0 4 0 5	15
11 -5 0 4 6 3 8 2 1 0 9 0	30

Problem C. Can look like a

Input file: standard input
Output file: standard output
Balloon Color: Light Blue

A *deja vu* is a French word expressing the feeling that one has lived through the present situation before. It seems that this story of the passionate Tota can look like a story written by a different self in a different universe, yet something seems to be a bit different.

Tota gives you a number X , determine the minimum number of beautiful numbers that you can XOR to get X or indicate that it is impossible.

A number is called beautiful if it has exactly two bits equal to one: the leftmost and rightmost, The rest of the bits are equal to zeros in the binary representation of the number.

For example: 3 is beautiful because $3 = (11)_2$, also $9 = (1001)_2$ is a beautiful number, while 7 is not $7 = (111)_2$.

Input

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

The first and only line of each test case contains only one number X ($1 \leq X \leq 10^{18}$).

Output

For each test case, print one line with one integer, the minimum number of beautiful numbers to XOR to get X . If it is impossible to get X using this method, print -1 .

Example

standard input	standard output
5	1
3	3
15	1
9	-1
4	16
85931740	

Note

1 is not a beautiful Number as it has only one bit.

Problem D. Duplicated version but

Input file: standard input
Output file: standard output
Balloon Color: Purple

A *deja vu* is a French loanword expressing when one feels they have lived through the same situation in the past. It almost looked like a duplicated version and they certainly got us in the first part, but even when things look exactly similar, the tiniest butterfly movement can make the whole difference.

Abo Taha decided to leave the computer engineering department and enroll in the communication and electronics engineering department because he thought it is much easier and doesn't require programming skills.

He was shocked when he met a graduate engineer who told him the following scenario:

There are N network towers in a city each stands on a point (X, Y) as the city is a 2D plane. Each tower covers an area around it that is in the shape of a circle. all we know is three points on the edge of the circle each tower covers, so each tower is defined by three points on its coverage circle. we want all the towers to be connected so that the data can move freely between any two of them.

Two towers are connected if their coverage circles intersect at at least one point or one of them contains the other inside of it or they are connected indirectly, for example, if tower one is connected to tower two and tower three is connected to tower one then towers two and three are connected even if they don't intersect nor one of them contains the other.

If two towers are not connected you can connect them using some fiber wire that goes from one tower to the other (remember that the tower is located in the center of its coverage circle).

We want to make all the towers connected using the minimum amount of fiber wire as it costs a lot so we need to know the minimum length required of fiber wire. The length of a wire between two towers is the distance between them.

After hearing that Abo Taha goes directly to the Architecture department and never thought of enrolling in the communication and electronics department or the computer department again.

But he believes in your great programming skills, so can you solve this problem?

Input

The first line contains one integer N which indicates the number of towers where $1 \leq N \leq 1000$.

For each of the N towers, three lines follow. Each line contains two integers the X, Y coordinates of a point $(-10^9 \leq X, Y \leq 10^9)$.

Output

Print the minimum length required of fiber wire ceiled to the nearest integer value.

Examples

standard input	standard output
3 4 4 6 7 8 5 1 -2 -2 3 -5 -2 2 -1 -1 -4 4 -6	10
3 4 4 6 7 8 5 5 4 3 1 7 1 5 2 3 -2 7 -2	0

Problem E. Guess Number

Input file: standard input
Output file: standard output
Balloon Color: Dark Green

We have a hidden number N , where $1 \leq N \leq 10^9$, Your is task to find it.

You guess a number X and we respond with three types of responses, “>” if $N > X$, “<” if $N < X$, or “=”. if the response is N equals X , which means your guess was correct and then, you shout print “! N” and terminate the program immediately.

If you make more than 30 guesses, you will receive a Wrong Answer verdict.

Interaction Protocol

After printing a number X do not forget to output end of line and flush the output. Otherwise, you will get `Idleness limit exceeded`. To do this, use:

- `fflush(stdout)` or `cout.flush()` in C++;
- `System.out.flush()` in Java;
- `flush(output)` in Pascal;
- `stdout.flush()` in Python;
- see documentation for other languages.

Example

standard input	standard output
<	11
>	6
>	9
=	10
	! 10