# Codeforces Round #318 [RussianCodeCup Thanks-Round] (Div. 2)

## A. Bear and Elections

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Limak is a grizzly bear who desires power and adoration. He wants to win in upcoming elections and rule over the Bearland.

There are $n$ candidates, including Limak. We know how many citizens are going to vote for each candidate. Now $i$-th candidate would get $a_i$ votes. Limak is candidate number $1$. To win in elections, he must get strictly more votes than any other candidate.

Victory is more important than everything else so Limak decided to cheat. He will steal votes from his opponents by bribing some citizens. To bribe a citizen, Limak must give him or her one candy - citizens are bears and bears like candies. Limak doesn't have many candies and wonders - how many citizens does he have to bribe?

### Input

The first line contains single integer $n$ ($2 \le n \le 100$) - number of candidates.

The second line contains $n$ space-separated integers $a_1, a_2, ..., a_n$ ($1 \le a_i \le 1000$) - number of votes for each candidate. Limak is candidate number $1$.

Note that after bribing number of votes for some candidate might be zero or might be greater than $1000$.

### Output

Print the minimum number of citizens Limak must bribe to have strictly more votes than any other candidate.

**Sample test(s)**

| input |
| --- |
| 5<br>5 1 11 2 8 |
| output |
| 4 |

| input |
| --- |
| 4<br>1 8 8 8 |
| output |
| 6 |

| input |
| --- |
| 2<br>7 6 |
| output |
| 0 |

### Note

In the first sample Limak has $5$ votes. One of the ways to achieve victory is to bribe $4$ citizens who want to vote for the third candidate. Then numbers of votes would be $9, 1, 7, 2, 8$ (Limak would have $9$ votes). Alternatively, Limak could steal only $3$ votes from the third candidate and $1$ vote from the second candidate to get situation $9, 0, 8, 2, 8$.

In the second sample Limak will steal $2$ votes from each candidate. Situation will be $7, 6, 6, 6$.

In the third sample Limak is a winner without bribing any citizen.

# B. Bear and Three Musketeers

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Do you know a story about the three musketeers? Anyway, you will learn about its origins now.

Richelimakieu is a cardinal in the city of Bearis. He is tired of dealing with crime by himself. He needs three brave warriors to help him to fight against bad guys.

There are $n$ warriors. Richelimakieu wants to choose three of them to become musketeers but it's not that easy. The most important condition is that musketeers must know each other to cooperate efficiently. And they shouldn't be too well known because they could be betrayed by old friends. For each musketeer his *recognition* is the number of warriors he knows, excluding other two musketeers.

Help Richelimakieu! Find if it is possible to choose three musketeers knowing each other, and what is minimum possible sum of their recognitions.

## Input

The first line contains two space-separated integers, $n$ and $m$ ($3 \le n \le 4000$, $0 \le m \le 4000$) — respectively number of warriors and number of pairs of warriors knowing each other.

$i$-th of the following $m$ lines contains two space-separated integers $a_i$ and $b_i$ ($1 \le a_i, b_i \le n$, $a_i \ne b_i$). Warriors $a_i$ and $b_i$ know each other. Each pair of warriors will be listed at most once.

## Output

If Richelimakieu can choose three musketeers, print the minimum possible sum of their recognitions. Otherwise, print "`-1`" (without the quotes).

**Sample test(s)**

| input |
| --- |
| 5 6<br>1 2<br>1 3<br>2 3<br>2 4<br>3 4<br>4 5 |
| output |
| 2 |

| input |
| --- |
| 7 4<br>2 1<br>3 6<br>5 1<br>1 7 |
| output |
| -1 |

## Note

In the first sample Richelimakieu should choose a triple $1, 2, 3$. The first musketeer doesn't know anyone except other two musketeers so his recognition is $0$. The second musketeer has recognition $1$ because he knows warrior number $4$. The third musketeer also has recognition $1$ because he knows warrior $4$. Sum of recognitions is $0 + 1 + 1 = 2$.

The other possible triple is $2, 3, 4$ but it has greater sum of recognitions, equal to $1 + 1 + 1 = 3$.

In the second sample there is no triple of warriors knowing each other.

# C. Bear and Poker

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Limak is an old brown bear. He often plays poker with his friends. Today they went to a casino. There are $n$ players (including Limak himself) and right now all of them have bids on the table. $i$-th of them has bid with size $a_i$ dollars.

Each player can double his bid any number of times and triple his bid any number of times. The casino has a great jackpot for making all bids equal. Is it possible that Limak and his friends will win a jackpot?

## Input

First line of input contains an integer $n$ ($2 \le n \le 10^5$), the number of players.

The second line contains $n$ integer numbers $a_1, a_2, ..., a_n$ ($1 \le a_i \le 10^9$) — the bids of players.

## Output

Print "`Yes`" (without the quotes) if players can make their bids become equal, or "`No`" otherwise.

**Sample test(s)**

| input |
| --- |
| 4<br>75 150 75 50 |
| output |
| Yes |

| input |
| --- |
| 3<br>100 150 250 |
| output |
| No |

## Note

In the first sample test first and third players should double their bids twice, second player should double his bid once and fourth player should both double and triple his bid.

It can be shown that in the second sample test there is no way to make all bids equal.

# D. Bear and Blocks

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Limak is a little bear who loves to play. Today he is playing by destroying block towers. He built $n$ towers in a row. The $i$-th tower is made of $h_i$ identical blocks. For clarification see picture for the first sample.

Limak will repeat the following operation till everything is destroyed.

Block is called internal if it has all four neighbors, i.e. it has each side (top, left, down and right) adjacent to other block or to the floor. Otherwise, block is boundary. In one operation Limak destroys all boundary blocks. His paws are very fast and he destroys all those blocks at the same time.

Limak is ready to start. You task is to count how many operations will it take him to destroy all towers.

## Input

The first line contains single integer $n$ ($1 \le n \le 10^5$).

The second line contains $n$ space-separated integers $h_1, h_2, ..., h_n$ ($1 \le h_i \le 10^9$) — sizes of towers.

## Output

Print the number of operations needed to destroy all towers.

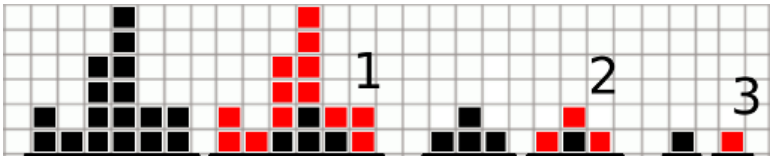
**Sample test(s)**

| input |
| --- |
| 6<br>2 1 4 6 2 2 |
| output |
| 3 |

| input |
| --- |
| 7<br>3 3 3 1 3 3 3 |
| output |
| 2 |

## Note

The picture below shows all three operations for the first sample test. Each time boundary blocks are marked with red color.




After first operation there are four blocks left and only one remains after second operation. This last block is destroyed in third operation.

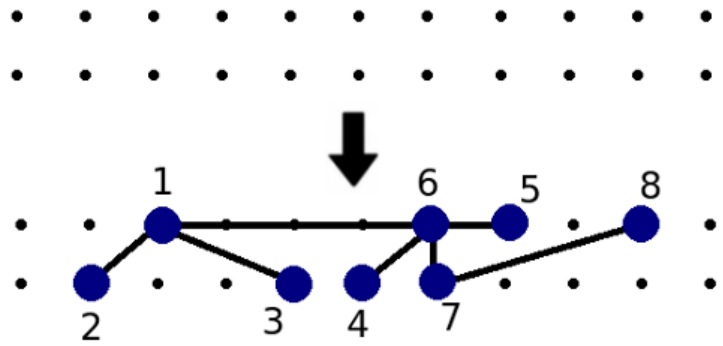
# E. Bear and Drawing

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Limak is a little bear who learns to draw. People usually start with houses, fences and flowers but why would bears do it? Limak lives in the forest and he decides to draw a tree.

Recall that *tree* is a connected graph consisting of $n$ vertices and $n - 1$ edges.

Limak chose a tree with $n$ vertices. He has infinite strip of paper with two parallel rows of dots. Little bear wants to assign vertices of a tree to some $n$ distinct dots on a paper so that edges would intersect only at their endpoints — drawn tree must be planar. Below you can see one of correct drawings for the first sample test.




Is it possible for Limak to draw chosen tree?

## Input

The first line contains single integer $n$ ($1 \le n \le 10^5$).

Next $n - 1$ lines contain description of a tree. $i$-th of them contains two space-separated integers $a_i$ and $b_i$ ($1 \le a_i, b_i \le n, a_i \ne b_i$) denoting an edge between vertices $a_i$ and $b_i$. It's guaranteed that given description forms a tree.

## Output

Print "Yes" (without the quotes) if Limak can draw chosen tree. Otherwise, print "No" (without the quotes).

**Sample test(s)**

| input |
| --- |
| 8<br>1 2<br>1 3<br>1 6<br>6 4<br>6 7<br>6 5<br>7 8 |
| output |
| Yes |

| input |
| --- |
| 13<br>1 2<br>1 3<br>1 4<br>2 5<br>2 6<br>2 7<br>3 8<br>3 9<br>3 10<br>4 11<br>4 12<br>4 13 |
| output |
| No |

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