Problem A. Task Failed Successfully

Time Limit 2000 ms

Problem Statement

Takahashi set task goals for N days.

He aimed to complete A_i tasks on day $i(1 \leq i \leq N)$, and actually completed B_i tasks.

Find the number of days when he completed more tasks than his goal.

Constraints

- $1 \leq N \leq 100$
- $1 \leq A_i, B_i \leq 100$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{array}{l}
N \\
A_1 \ \ B_1 \\
A_2 \ \ B_2 \\
\vdots \\
A_N \ \ B_N
\end{array}
$$

Output

Output the answer.

Sample 1

Input	Output
4 2 8 5 5 5 4 6 7	2

Takahashi completed more tasks than his goal on the 1st and 4th days.

Sample 2

Input	Output
5 1 1 1 1 1 1 1 1 1 1	0

Sample 3

Input	Output
6 1 6 2 5 3 4 4 3 5 2 6 1	3

Problem B. Chord

Time Limit 2000 ms
Mem Limit 1048576 kB

Problem Statement

Given a length-3 string S consisting of uppercase English letters, print `Yes` if S equals one of `ACE`, `BDF`, `CEG`, `DFA`, `EGB`, `FAC`, and `GBD`; print `No` otherwise.

Constraints

- S is a length-3 string consisting of uppercase English letters.

Input

The input is given from Standard Input in the following format:

```
S
```

Output

Print `Yes` if S equals one of `ACE`, `BDF`, `CEG`, `DFA`, `EGB`, `FAC`, and `GBD`; print `No` otherwise.

Sample 1

Input	Output
ABC	No

When $S =$ `ABC`, S does not equal any of `ACE`, `BDF`, `CEG`, `DFA`, `EGB`, `FAC`, and `GBD`, so `No` should be printed.

Sample 2

Input	Output
`FAC`	`Yes`

Sample 3

Input	Output
`XYX`	`No`

Problem C. Precondition

Time Limit 2000 ms

Problem Statement

You are given strings S and T consisting of lowercase and uppercase English letters.

Determine whether the string S satisfies the following condition:

- Every uppercase letter in S that is not at the beginning is immediately preceded by a character contained in T. More formally, for all integers i such that $2 \leq i \leq |S|$, if the i-th character of S is uppercase, then the $(i-1)$-th character of S is contained in T.

Constraints

- Each of S and T is a string consisting of lowercase and uppercase English letters with length between 1 and 100, inclusive.

Input

The input is given from Standard Input in the following format:

S
T

Output

If S satisfies the condition in the problem statement, output `Yes`. Otherwise, output `No`.

Sample 1

Input	Output
`AtCoder` `Total`	`Yes`

The only uppercase letter in S that is not at the beginning is the 3rd character `C`. The immediately preceding character `t` is contained in T, so output `Yes`.

Sample 2

Input	Output
aBCdE abcdcba	No

The 3rd character of S is the uppercase letter `C`, and its immediately preceding character is `B`, but `B` is not contained in T.

Sample 3

Input	Output
abcde XYZ	Yes

Problem D. Giant Domino

Time Limit 2000 ms

Problem Statement

There are N dominoes numbered from 1 to N. The size of domino i is S_i.
Consider arranging some dominoes in a line from left to right and then toppling them.
When domino i falls to the right, if the size of the domino placed immediately to the right of domino i is at most $2S_i$, then that domino also falls to the right.

You decided to choose two or more dominoes and arrange them in a line from left to right.
The arrangement of dominoes must satisfy the following conditions:

- The leftmost domino is domino 1.
- The rightmost domino is domino N.
- When only domino 1 is toppled to the right, domino N eventually falls to the right as well.

Does an arrangement of dominoes satisfying the conditions exist? If it exists, what is the minimum number of dominoes that need to be arranged?

You are given T test cases, solve the problem for each of them.

Constraints

- $1 \leq T \leq 10^5$
- $2 \leq N \leq 2 \times 10^5$
- $1 \leq S_i \leq 10^9$
- The sum of N over all test cases is at most 2×10^5.
- All input values are integers.

Input

The input is given from Standard Input in the following format, where case_i means the i-th test case:

$$
\begin{array}{l}
T \\
\text{case}_1 \\
\text{case}_2
\end{array}
$$

$\vdots$
case_T

Each test case is given in the following format:

N
$S_1\ S_2\ \ldots\ S_N$

Output

Output T lines. The i-th line should contain the answer for the i-th test case.
For each test case, if there is no arrangement of dominoes satisfying the conditions, output `-1`; otherwise, output the minimum number of dominoes to arrange.

Sample 1

Input	Output
3 4 1 3 2 5 2 1 100 10 298077099 766294630 440423914 59187620 725560241 585990757 965580536 623321126 550925214 917827435	4 -1 3

For the 1st test case, arranging the dominoes from left to right in the order domino 1, domino 3, domino 2, domino 4 satisfies the conditions in the problem statement.
Specifically, for the 3rd condition, when only domino 1 is toppled to the right, the dominoes fall in the following order:

- Domino 3 is placed to the right of domino 1. Since the size of domino 3, $S_3 = 2$, is not greater than $S_1 \times 2 = 1 \times 2 = 2$, domino 3 also falls to the right.
- Domino 2 is placed to the right of domino 3. Since the size of domino 2, $S_2 = 3$, is not greater than $S_3 \times 2 = 2 \times 2 = 4$, domino 2 also falls to the right.
- Domino 4 is placed to the right of domino 2. Since the size of domino 4, $S_4 = 5$, is not greater than $S_2 \times 2 = 3 \times 2 = 6$, domino 4 also falls to the right.

It is impossible to achieve the conditions in the problem statement by arranging 3 or fewer dominoes, so the answer is 4.

Problem E. Make 2-Regular Graph

Time Limit 2000 ms

Problem Statement

There is a simple undirected graph G with N vertices and M edges. The vertices are numbered $1, 2, \ldots, N$, and the i-th edge is an undirected edge connecting vertices A_i and B_i.

You can repeat the following two operations in any order and any number of times:

- Add one undirected edge to G
- Remove one undirected edge from G

Find the minimum number of operations to make G a simple undirected graph where all vertices have degree 2.

▶ What is a simple undirected graph?

Constraints

- $3 \leq N \leq 8$
- $0 \leq M \leq \frac{N(N-1)}{2}$
- The graph G given in the input is a simple undirected graph.
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{array}{l}
N \ M \\
A_1 \ B_1 \\
\vdots \\
A_M \ B_M
\end{array}
$$

Output

Output the answer.

Sample 1

Input	Output
5 4 1 2 1 5 2 4 4 5	3

For example, the following three operations make G a simple undirected graph where all vertices have degree 2.

- Add an edge connecting vertices 2 and 3.
- Remove the edge connecting vertices 2 and 4.
- Add an edge connecting vertices 3 and 4.

Sample 2

Input	Output
3 0	3

Sample 3

Input	Output
6 8 1 4 1 5 2 3 2 6 3 4 3 6 4 5 4 6	2

Sample 4

Input	Output
8 21 1 4 5 7 8 4 3 4 2 5 8 1 5 1 2 8 2 1 2 4 3 1 6 7 5 8 2 7 6 8 5 4 3 8 7 3 7 8 5 3 7 4	13

Problem F. LCM Sequence

Time Limit 4000 ms

Problem Statement

For a positive integer n, define A_n as the least common multiple of $1, 2, \ldots, n$.
You are given positive integers L and R. How many distinct integers are contained in the sequence $(A_L, A_{L+1}, \ldots, A_R)$?

Constraints

- $1 \le L \le R \le 10^{14}$
- $R - L \le 10^7$
- L and R are integers.

Input

The input is given from Standard Input in the following format:

```
L R
```

Output

Output the number of distinct integers contained in the sequence $(A_L, A_{L+1}, \ldots, A_R)$.

Sample 1

Input	Output
4 12	6

Listing A_4 through A_{12}:

- $A_4 = 12$
- $A_5 = 60$
- $A_6 = 60$
- $A_7 = 420$

- $A_8 = 840$
- $A_9 = 2520$
- $A_{10} = 2520$
- $A_{11} = 27720$
- $A_{12} = 27720$

Thus, $(A_4, A_5, \ldots, A_{12})$ contains six distinct integers.

Sample 2

Input	Output
`123456789 123456789`	`1`

Sample 3

Input	Output
`99999990000000 100000000000000`	`310458`

Problem G. Socks 4

Time Limit 2000 ms

Problem Statement

In Takahashi's chest of drawers, there are socks of N colors, with A_i socks of color i.

Initially, Takahashi has one sock of color C outside the chest of drawers, separate from these socks, and repeats the following operation until the termination condition is met:

- Uniformly randomly choose and draw 1 sock from the chest of drawers. Then, if the two socks he has outside the chest of drawers are the same color, terminate the operation. Otherwise, choose one of the socks and put it back in the chest of drawers. He always chooses the sock to put back so as to minimize the expected number of future sock draws.

Find the expected number, modulo 998244353, of sock draws until the operation terminates.

▶ Finding the expected value modulo 998244353

Constraints

- $1 \leq N \leq 3 \times 10^5$
- $1 \leq C \leq N$
- $1 \leq A_i \leq 3000$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

N C
A_1 A_2 $\ldots$ A_N

Output

Output the answer.

Sample 1

Input	Output
3 2 3 1 2	249561092

The expected number of sock draws is $\frac{15}{4}$.

Sample 2

Input	Output
8 4 4 1 6 2 5 1 7 3	393623786

Problem H. Degree Harmony

Time Limit 2000 ms

Problem Statement

You are given a simple undirected graph G with N vertices and M edges, where vertices are numbered from 1 to N. The i-th edge connects vertices u_i and v_i.
A spanning subgraph G' of G that satisfies the following condition is called a **good graph**:

- For all integers i satisfying $1 \leq i \leq N$, the following condition holds:
  - Let d_i be the degree of vertex i in G'. Then, $d_i \leq A_i$ and $d_i \bmod 2 = A_i \bmod 2$ hold.

Determine whether a good graph exists. If it exists, output the minimum number of edges among all possible good graphs.

Constraints

- $1 \leq N \leq 150$
- $0 \leq M \leq \frac{N(N-1)}{2}$
- $1 \leq u_i < v_i \leq N$
- The given graph is simple.
- $1 \leq A_i \leq 150$
- $1 \leq \sum_{i=1}^{N} A_i \leq 150$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{array}{l}
N \ M \\
A_1 \ A_2 \ \ldots \ A_N \\
u_1 \ v_1 \\
u_2 \ v_2 \\
\vdots \\
u_M \ v_M
\end{array}
$$

Output

If no good graph exists, output `-1`. If it exists, output the minimum number of edges among all possible good graphs.

Sample 1

Input	Output
3 3 1 2 3 1 2 1 3 2 3	1

The spanning subgraph whose edge set consists of only the 2nd edge is a good graph.

Sample 2

Input	Output
4 3 1 1 1 1 1 3 2 3 3 4	-1

Sample 3

Input	Output
5 6 3 1 4 3 1 1 2 1 3 1 4 2 3 3 4 3 5	3