Problem A. Pies

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

Cossack Vus has exactly n pies and m friends.

It is known that each of his friends wants to be given exactly three pies.

Cossack Vus will not let his friends down, so he will give each of them what they want.

Determine how many pies will remain with Cossack Vus if he gives three pies to each friend. It is known that Cossack has enough pies.

Input

The first line contains one integer n ($3 \le n \le 100$) — the number of pies.

The second line contains one integer m ($1 \le m \le 100$) — the number of Cossack Vus's friends.

It is guaranteed that Vus will have enough pies to give to all his friends.

Output

Output one integer — the number of pies that will remain with Cossack Vus after he gives them to his friends.

Example

standard input	standard output
10 2	4

Note

Cossack has two friends, to each of whom he will give three pies. In total, he will give away six, so only four pies will remain.

Problem B. Arithmetic Mean

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

Cossack Vus has two integers a and b ($a \le b$). He found the arithmetic mean of these numbers (let it be the number c). That is, $c = \frac{a+b}{2}$.

You are given the number a (i.e., the smaller of the two numbers), as well as the number c. Find b.

Input

The first line contains one integer a ($1 \le a \le 100$).

The second line contains one integer c ($a \le c \le 100$).

Output

Output one integer — b.

Example

standard input	standard output
3 7	11

Problem C. Cossack Vus and Friend at CP Olympiad

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1.2 seconds
Memory limit:	256 megabytes

Once Cossack Vus had to monitor his friend's participation in a competitive programming olympiad.

There are m problems at the olympiad, each of which is scored as an **integer** from 0 to 100. If a participant solves a problem and receives x points at time t_0, then at any time $t \geq t_0$, the number of points for that problem will not be less than x.

Cossack Vus was busy that day, so he couldn't keep track of his friend's results. Therefore, he decided to take screenshots of the screen every 10 minutes of the olympiad. In total, he took n screenshots. Each screenshot shows the number of points his friend had at a certain time.

Unfortunately, all the screenshots got mixed up in Vus's gallery. Your task is to determine if the order of the screenshots in the gallery is possible.

Input

The first line contains two integers n, m ($1 \leq n, m \leq 3000$) — the number of screenshots and the number of problems, respectively.

Each of the next n lines contains m integers a_{ij} ($0 \leq a_{i,j} \leq 100$) — the number of points for problem j on the i-th screenshot.

Output

Output «`Yes`» if the screenshots in the gallery are in the same order as the time they were taken, and «`No`» otherwise.

Scoring

In this problem, there are conditional blocks. If your solution works correctly for certain constraints, it will receive a certain number of points. Note that the evaluation is still in the testing phase.

1. (50 points): $n, m \leq 100$;
2. (50 points): without additional constraints.

Examples

standard input	standard output
6 5 15 0 0 0 0 15 30 0 0 0 15 70 0 0 0 15 70 0 0 100 15 70 25 0 100 15 70 25 0 100	Yes
2 3 97 0 0 2 100 100	No

Note

In the first test, there were 5 problems at the olympiad and it lasted for 60 minutes. The answer is «`Yes`» because the events could have occurred in the following order:

- in the first 10 minutes, Vus's friend solved the first problem and scored 15 points;
- in the next 10 minutes, he solved the second problem and scored 30 points;
- then he tried to solve the second problem again and managed to score 70 points;
- after that, he attempted the last problem and scored 100 points;
- then he solved the third problem and scored 25 points;
- in the last 10 minutes, he couldn't solve anything.

One reason why the answer is «No» in the second test is that in the first 10 minutes, he solved the first problem and scored 97 points, but in the last 10 minutes, he somehow had only 2 points, which is not possible.

Problem D. Add and Minimize

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

You are given an array $a_1, a_2, \ldots, a_n$ and a string $s_1, s_2, \ldots, s_n$.

You can change the order of elements in the array a as you like.

Your task is to make the string $s_1 + a_1, s_2 + a_2, \ldots, s_n + a_n$ lexicographically minimal.

$s_i + a_i$ means that s_i has been replaced by the next letter in the alphabet exactly a_i times. The letter "z"is replaced by "a".

A string A is lexicographically smaller than a string B if in the first position where A and B differ, the character at position A is smaller than the character at position B.

Input

The first line contains the number n ($1 \le n \le 10^5$) — the size of the array and the string.

The second line contains n integers $a_1, \ldots, a_n$ ($1 \le a_i \le 10^9$) — the elements of the array a.

The third line contains the string s with n characters. It is guaranteed that all characters in the string are lowercase letters of the English alphabet.

Output

Output the lexicographically minimal string $s_1 + a_1, \ldots, s_n + a_n$ after changing the order of the elements in a.

Scoring

In this problem, there are conditional blocks. If your solution works correctly for certain constraints, it will receive a certain number of points. Please note that the evaluation is still being tested.

1. (5 points): $n \le 5$, $a_i \le 1000$;
2. (20 points): $n \le 3000$;
3. (75 points): without additional constraints.

Examples

standard input	standard output
3 1 2 3 abc	bdf
5 2 26 4 6 1 abzxy	acbbe

Note

In the first test, there are a total of 6 ways to change the order of the array elements:

- $a = [1, 2, 3]$, $s = ['a' + 1, 'b' + 2, 'c' + 3] = ['b', 'd', 'f'] =$"$bdf$";
- $a = [1, 3, 2]$, $s = ['a' + 1, 'b' + 3, 'c' + 2] = ['b', 'e', 'e'] =$"$bee$";

- $a = [2, 1, 3]$, $s = [\text{'}a\text{'} + 2, \text{'}b\text{'} + 1, \text{'}c\text{'} + 3] = [\text{'}c\text{'}, \text{'}c\text{'}, \text{'}f\text{'}] =$"$ccf$";
- $a = [2, 3, 1]$, $s = [\text{'}a\text{'} + 2, \text{'}b\text{'} + 3, \text{'}c\text{'} + 1] = [\text{'}c\text{'}, \text{'}e\text{'}, \text{'}d\text{'}] =$"$ced$";
- $a = [3, 1, 2]$, $s = [\text{'}a\text{'} + 3, \text{'}b\text{'} + 1, \text{'}c\text{'} + 2] = [\text{'}d\text{'}, \text{'}c\text{'}, \text{'}e\text{'}] =$"$dce$";
- $a = [3, 2, 1]$, $s = [\text{'}a\text{'} + 3, \text{'}b\text{'} + 2, \text{'}c\text{'} + 1] = [\text{'}d\text{'}, \text{'}d\text{'}, \text{'}d\text{'}] =$"$ddd$".

The lexicographically minimal of these strings is "bdf".

In the second test, the optimal order of elements is $a = [26, 1, 2, 4, 6]$.

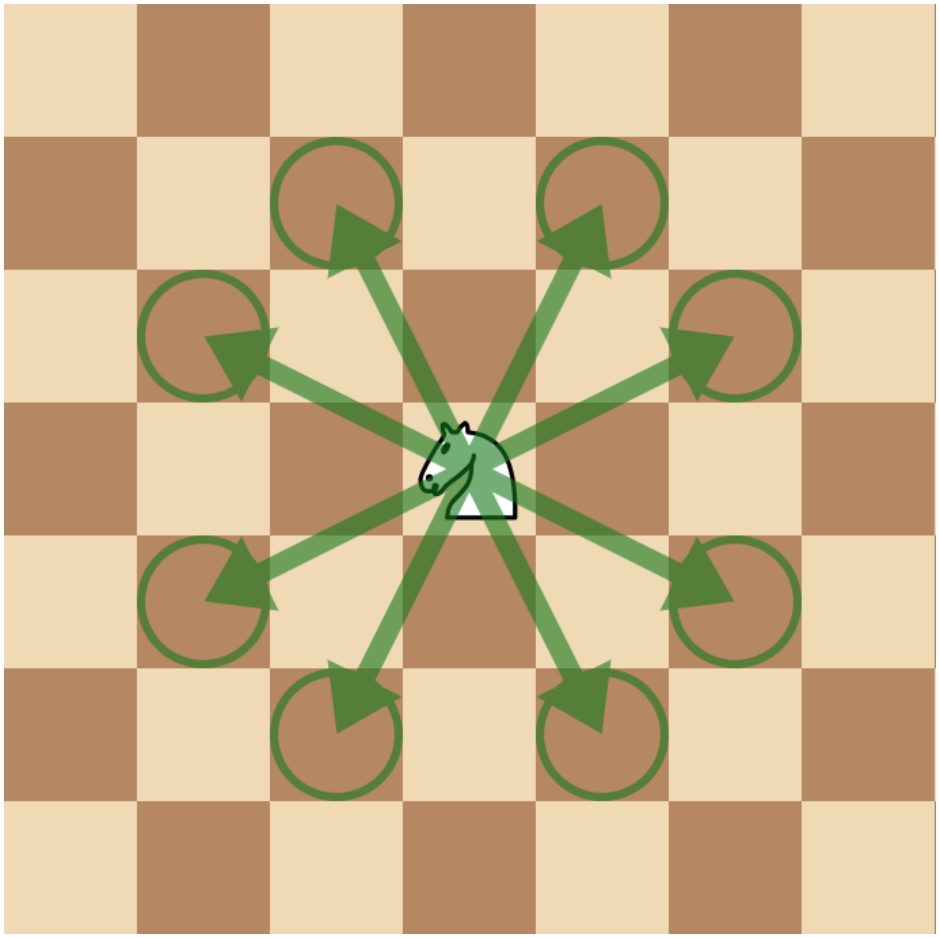
Problem E. Magic Knights

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

You have k chess knights, and you want to place them on a certain number of chessboards of size $n \times n$ in such a way that no pair of knights is attacking each other.

Because you are a very economical person, you are interested in the minimum number of chessboards of size $n \times n$ that need to be purchased in order to accommodate at least k chess knights in total.

A chess knight is a piece that can move in the following way in one move:



Input

The first line contains two integers n, k ($1 \le n \le 10^9$, $1 \le k \le 10^{18}$).

Output

Output a single number in one line — the answer to the problem.

Scoring

In this problem, there are conditional blocks. If your solution works correctly for certain constraints, it will receive a certain number of points. Note that the evaluation is still in testing.

1. (8 points): $n \le 5, k \le 20$;

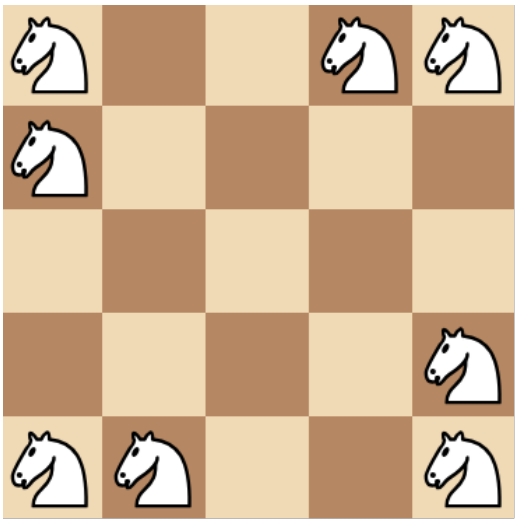
2. (30 points): $n, k \leq 10^6$;
3. (28 points): $n, k \leq 10^9$;
4. (34 points): without additional constraints.

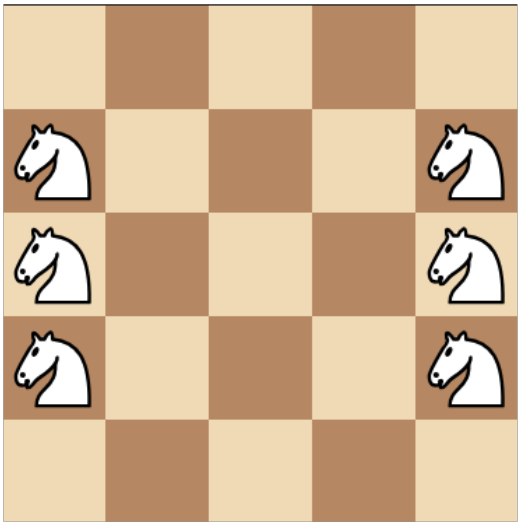
Examples

standard input	standard output
5 14	2
5 1	1
2 4	1

Note

An example of one of the optimal knight placements in the first test:





Problem F. Trivial? Solve It!

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

You are given an array of integers $a_1, a_2, \ldots, a_n$. Your task is to process q queries:

- add an integer x to all elements of the array.

After each query, output the greatest common divisor of all elements of the array.

Input

The first line contains two integers n, q ($1 \le n, q \le 2 \cdot 10^5$) — the size of the array and the number of queries, respectively.

The second line contains n integers $a_1, \ldots, a_n$ ($1 \le a_i \le 10^9$) — the elements of the array a.

Each of the next q lines contains one integer x ($1 \le x \le 10^9$).

Output

Output q numbers — the greatest common divisor of the elements of the array after each addition.

Scoring

In this problem, there are conditional blocks. If your solution works correctly for certain constraints, it will receive a certain number of points. Note that the evaluation is still in the testing phase.

1. (5 points): $a_1 = a_2 = \cdots = a_n$;
2. (15 points): $n, q \le 1000$;
3. (40 points): the number of different elements among $a_1, \ldots, a_n$ is no more than 100;
4. (40 points): without additional constraints.

Example

standard input	standard output
3 3 1 9 17 1 2 4	2 4 8

Note

After the first query $a = [2, 10, 18]$ because 1 was added to each element. The greatest common divisor in it is 2.

After the second query $a = [4, 12, 20]$ because 2 was added to each element. The greatest common divisor in it is 4.

After the third query $a = [8, 16, 24]$ because 4 was added to each element. The greatest common divisor in it is 8.