

Problem A. Ginger's number

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

Ginger have two positive integers x, y , you have to do exactly one operation:

Choose two positive integers a, b , change x to $\frac{x}{a}$, and change y to $\frac{y}{b}$, (a must be a divisor of x , b must be a divisor of y and $\gcd(\frac{x}{a}, \frac{y}{b}) = 1$).

Find the minimum value of $a \times b$.

Input

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

For each test case, the only line of input contains two positive integers x, y ($1 \leq x, y \leq 10^9$).

Output

Print the minimum value of $a \times b$.

Example

standard input	standard output
1 114514 1919810	2

Problem B. Ginger's game

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

There are n monsters with $a_1, a_2, \dots, a_n$ HP in game. Before the start of the game, Ginger can set the HP a_i of each monster to any non-negative integer less than or equal to a_i . When the game starts, Ginger can choose any position i ($1 \leq i \leq n$), and then Ginger must kill the monsters in the order of $i, i-1, \dots, 1$, and the HP of the attacked monsters must follow the order of non-strict decreasing, Ginger will get $\sum_{j=1}^i a_j$ money.

Find the maximum money.

Input

The first line contains a integer n ($1 \leq n \leq 2 \times 10^5$) indicating the number of monsters HP.

The second line contains n integers $a_1, a_2, \dots, a_n$ ($1 \leq a_i \leq 10^9$) indicating the monsters HP.

Output

Print the maximum money.

Example

standard input	standard output
5 8 5 4 7 2	19

Note

For test case:

Before the start of the game, the monster's HP is set to $[4, 4, 4, 7, 2]$.

When the game starts, Ginger chooses position $i = 4$, Ginger will get $7 + 4 + 4 + 4 = 19$ money.

Problem C. Ginger's sequence

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

Ginger gives you a sequence of length n , please ask if there are two non-empty different subsequences in this sequence, such that $s_1 \equiv s_2 \pmod k$, s_1, s_2 are the sum of the two subsequences respectively.

If there exist, output YES, otherwise output NO.

Input

The first line contains two integers n, k ($1 \leq n, k \leq 10^5$) indicating the length of sequence and modulo.

The second line contains n integers $a_1, a_2, \dots, a_n$ indicating the sequence.

Output

Print YES or NO.

Example

standard input	standard output
5 10 1 2 3 4 5	YES

Note

Subsequence is a sequence that can be derived from another sequence by deleting some elements without changing the order of the remaining elements.

Problem D. Ginger's line

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

Ginger have n straight lines $y = a_i x + b_i$, now Ginger wants to know how many pairs of straight lines $i, j (i < j)$ intersect.

Input

The first line contains a integer n ($1 \leq n \leq 5 \times 10^3$) indicating the number of lines.

The next n lines contains two integers a_i, b_i ($10^{-3} \leq a_i, b_i \leq 10^3$) indicating line $y = a_i x + b_i$.

Output

Print the pairs of intersections of lines.

Examples

standard input	standard output
5 1 1 2 2 3 3 4 4 5 5	10
2 1 0 1 0	0

Note

Note that overlapping lines do not intersect.

Problem E. Ginger's coloring

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

Given an permutation $p_1, p_2, \dots, p_n$ of length n , now color each number from 1 to n in black and white.

Define **Ginger coloring** as:

for all i ($1 \leq i \leq n$), the color of i not equal to the color of p_i .

How many ways of coloring make permutation p become **Ginger coloring** modulo 998 244 353.

Input

The first line contains a integer n ($1 \leq n \leq 10^5$) indicating the lenth of permutation.

The next line contains n integers $p_1, p_2, \dots, p_n$ ($1 \leq p_i \leq n$) indicating the permutation.

Output

Output the ways of coloring modulo 998 244 353.

Example

standard input	standard output
6 2 3 4 1 6 5	4

Problem G. Ginger's password

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

Ginger forgot his password, but Ginger has a habit of setting passwords, except for the first bit, each bit is not lexicographically smaller than the previous bit, in another word, the entire password string is non-descending, and each letter has a number limit.

Now Ginger only remembers a subsequence of the password string s and the length of the original password string k . Can you help Ginger calculate how many possible original password string modulo 998 244 353.

If the original password is not found, output NO SOLUTION!

Input

The first line contains two integers n, k ($1 \leq n, k \leq 10^3$) indicating the length of the password string subsequence that Ginger remembers and the length of entire password string.

The second line contains 26 integers $a_1, a_2, \dots, a_n$ ($0 \leq a_i \leq 10^9$) indicating Occurrence limit of each letter from a to z.

The third line contains a string s , contains only lowercase letters.

Output

Print the ways of possible original password string modulo 998 244 353 if it's exist, otherwise print NO SOLUTION!

Examples

standard input	standard output
3 3 1 1 4 5 1 4 1 9 1 9 8 1 0 1 1 4 5 1 4 1 9 1 9 8 1 0 abc	1
3 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 aab	NO SOLUTION!

Note

Subsequence is a sequence that can be derived from another sequence by deleting some elements without changing the order of the remaining elements.

Problem H. Ginger's clone

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

There is a matrix of size $n \times n$, each cell of the matrix has a number. Initially, Ginger stands in the upper left grid and the initial direction is downward, and Ginger's clone is in the lower right grid and the initial direction is upward.

Ginger and his clone will continue to walk in one direction, until the next grid is walked or beyond the matrix range, will turn 90° to the left and change direction to continue walking.

Finally, output the numbered sequence that Ginger and the clone walked through.

Note that if Ginger and his clone walk to a grid at the same time, the number of the grid is regarded as Ginger walking, not Ginger's clone.

Input

The first line contains a integer n ($2 \leq n \leq 200$) indicating side length of square matrix.

The next line, contains the matrix of size $n \times n$, indicating the number of each grid (there is no grid with the same number in the matrix, and guarantee the number must be in the range of positive integers).

Output

The output consists of two lines. The first line represents the number sequence of Ginger's walk, and the second line represents the number sequence of the clone's walk.

Examples

standard input	standard output
3 1 2 3 4 5 6 7 8 9	1 4 7 8 5 9 6 3 2
4 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	1 5 9 13 14 15 11 7 16 12 8 4 3 2 6 10

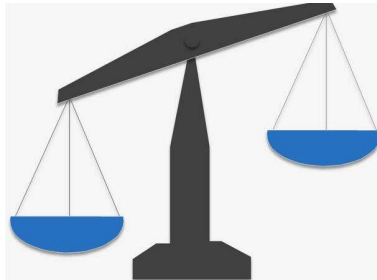
Note

In test case 1, Ginger and the clone will arrive at the grid numbered 5 at the same time, which is regarded as Ginger.

Problem I. Ginger's balance

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

Ginger has a balance. Each plate can only hold n items(the balance has two plates). Now Ginger has m items, one of which is a bad item, the rest of the items are the same weight, and Ginger wants to know the minimum number of times he weighs to be sure to find the bad item.



Input

The first line contains two integers n ($1 \leq n \leq 10^4$), m ($1 \leq m \leq 10^6$).

Output

Print the minimum times.

Examples

standard input	standard output
2 4	2
100 10	3

Problem J. Ginger's cow

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

Ginger has a total of n cows, he has m old cows and $n - m$ small cows. Old cows can feed small cows, Ginger wants to pair as many cows with small cows as possible.

Ginger wants to know the maximum number of small cows that can be fed

Input

The first line contains three integers m indicating the number of old cows, n indicating the number of cows, q indicating feeding relationship. $1 \leq m \leq n \leq 100$, $1 \leq q \leq 10^3$

Next q lines, each line has two strings u, v , representing old cows u can feed small cows v

Output

Print the maximum number of small cows that can be fed.

Example

standard input	standard output
5 10 10 A G A H B F B I B J C G C H D G D H E J	4

Problem K. Ginger's palindrome

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

Ginger has n numbers $a_1, a_2, \dots, a_n$, the value of a_i is c_i . Ginger will choose some of these numbers so that put together it is a palindrome, the same number can be chose multiple times.

Ginger wants to know the minimum value.

Input

The first line contain a integer n ($1 \leq n \leq 40$) indicate number of numbers.

The next n line, each line contains two integers a_i, c_i ($0 \leq a_i, c_i \leq 10^9$)

Output

Print the minimum value.

Example

standard input	standard output
5 12 21 21 13 13 111 45 19 331 12	34

Note

If there is a number chose multiple times, the value is the value of the number $\times$ number of choices

For test case:

Choose the 1 and 2 numbers to form a 1221 palindrome with a value of $21 + 13 = 34$

Choose the 3 and 5 numbers to form a 13331 palindrome with a value of $111 + 12 = 123$

Select 4 number alone, palindrome 111, value 331

Problem L. Ginger's function

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

Ginger has a function

$$G(x) = \prod_{i=1}^n (1 - x^{\lfloor \frac{f_i}{2} \rfloor} - x^{f_i})$$

Ginger decides to give you q inquiries, given a integer a for each query, answer the coefficient of x^a .

Input

The first line contains two integers n ($1 \leq n \leq 11$), q ($1 \leq q \leq 10^4$).

The second line contains n integers $f_1, f_2, \dots, f_n$ ($0 \leq f_i \leq 10^6$).

The next q lines contains a integer a ($0 \leq a \leq \sum_{i=1}^n f_i$)

Output

output q lines, Each line print the answer.

Example

standard input	standard output
2 5	1
3 4	-1
0	-1
1	0
2	2
3	
5	

Note

For test case:

$$(1 - x - x^3)(1 - x^2 - x^4) = 1 - x - x^2 - x^4 + 2x^5 + x^7$$