Problem A. Parallelepiped

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

You are given the dimensions of a parallelepiped, find its volume.

Input

The first line contains one integer n ($1 \le n \le 10$) — the height of the parallelepiped.

The second line contains one integer m ($1 \le m \le 10$) — the width of the parallelepiped.

The third line contains one integer k ($1 \le k \le 10$) — the length of the parallelepiped.

Output

Output one integer — the volume of the parallelepiped.

Example

standard input	standard output
2 3 4	24

Problem B. Grandchildren

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

Cossack Vus has exactly x sons. Each of his sons has exactly $(x + 1)$ sons. And each of his grandsons has exactly $(x + 2)$ sons.

Determine how many great-grandsons Cossack Vus has?

Input

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

Output

Output a single integer — the answer to the problem.

Example

standard input	standard output
2	24

Problem C. Colorful Balls

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

Bodya found three boxes on the way to school. Each box contains a certain number of yellow and blue balls. Bodia decided to arrange them in such a way that one of the three boxes would be empty, one would contain only yellow balls, and one would contain only blue balls.

Bodya doesn't want to be late for the first lesson, help him determine the minimum number of rearrangements to organize the balls in the boxes.

Input

The first line contains two integers y_1, b_1 ($0 \le y_1, b_1 \le 100$) — the number of yellow and blue balls in the first box, respectively.

The second line contains two integers y_2, b_2 ($0 \le y_2, b_2 \le 100$) — the number of yellow and blue balls in the second box, respectively.

The third line contains two integers y_3, b_3 ($0 \le y_3, b_3 \le 100$) — the number of yellow and blue balls in the third box, respectively.

Output

Output a single number — the minimum number of rearrangements.

Examples

standard input	standard output
3 2 1 0 1 3	4
2 0 0 9 0 0	0

Note

Explanation for the first test:

Положення кульок в ящиках до взаємодії

Положення кульок в ящиках після 1 переставляння

Положення кульок в ящиках після 2 переставлянь

Положення кульок в ящиках після 3 переставляння

Положення кульок в ящиках після 4 переставлянь

Problem D. Colorful String

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

You are given a string s of length $2n$, which consists only of zeros and ones. At the beginning, all the characters are colored in black. You can choose any n characters from the string and color them in red.

After that, you form two new strings, the first one is the characters colored in black, and the second one is the characters colored in red. Note that both resulting strings have a length of n.

Your task is to determine whether it is possible to color in such a way that the resulting two strings differ in each position.

Input

The first line contains one number n ($1 \le n \le 1,000$).

The second line contains $2n$ characters $s_1, \ldots, s_{2n}$ ($s_i \in \{0, 1\}$).

Output

Print «`Yes`» if the coloring described in the condition exists, or «`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): $n \le 20$;
2. (50 points): without additional constraints.

Examples

standard input	standard output
3 100101	Yes
4 10010100	No

Note

In the first test, the input string "100101"in which all the digits are colored in black. It is possible to color the digits at positions $1, 4, 5$ in red. The newly formed strings will be "001"and "110". They differ in each position.

Problem E. Painting stones

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

You have in front of you n stones, each of which is painted in a color, namely the i-th stone is painted in color a_i.

In one operation, you can choose any two **adjacent** stones and paint them in any same color.

You need all the stones to become the same color with the minimum number of operations.

Input

The first line contains one integer n ($1 \le n \le 2 \cdot 10^5$) — the number of stones.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le n$) — the colors of the stones.

Output

Output a single number — the minimum number of operations.

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 progress.

1. (32 points): the number of different numbers among all a_i is not more than 2;
2. (33 points): $n \le 1\,000$;
3. (35 points): without additional constraints.

Example

standard input	standard output
6 1 3 1 5 3 5	3

Note

In the first test, the stones are painted in colors $1, 3, 1, 5, 3, 5$ respectively.

For the first operation, you can paint the stones at positions $4, 5$ in color 1, after which the stones will be $1, 3, 1, 1, 1, 5$.

For the second operation, you can paint the stones at positions $1, 2$ in color 1. Now the stones are painted in $1, 1, 1, 1, 1, 5$.

For the last operation, you can paint the last two stones in color 1, after which all the stones will be of the same color (1).

Problem F. Pairwise Product

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	256 megabytes

You are given an array of integers $a_1, a_2, \ldots, a_n$. Your task is to answer queries of the following type:

- For given l, r, output the sum of products for all pairs $l \le i < j \le r$. Formally, you need to compute $\sum_{l \le i < j \le r} a_i \cdot a_j$. The answer may be large, so output it modulo $10^9 + 7$.

Input

The first line contains a single number n ($2 \le n \le 2 \cdot 10^5$) — the size of the array a.

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

The third line contains a single integer q ($1 \le q \le 2 \cdot 10^5$) — the number of queries.

Each of the next q lines contains two integers l and r ($1 \le l < r \le n$).

Output

Output q lines — the answer to each query.

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 in the testing phase.

1. (29 points): $n \le 100$, $q \le 100$;
2. (36 points): $n \le 10\,000$, $q \le 100$;
3. (35 points): without additional constraints.

Examples

standard input	standard output
2 1 2 1 1 2	2
5 2 3 4 5 6 6 1 4 3 5 1 5 2 3 4 5 2 5	71 74 155 12 30 119
5 100 10000 100000 1000000 10000000 1 1 5	110921516

Problem G. Sashko-Array Constructor

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

You are given the numbers x and d. Your task is to find any array that simultaneously satisfies the following criteria:

- $a_1 \times a_2 \times \cdots \times a_n = x$, where n is the size of your array;
- $1 \le a_i \le d$ for each $1 \le i \le n$;
- the size of the array is minimal possible.

Input

The single line contains two integers x ($2 \le x \le 10^9$) and d ($2 \le d \le 10^9$)

Output

If such an array does not exist, then output "-1".

Otherwise, in the first line, output the number n ($1 \le n \le 1000$) — the minimal size of the array.

In the second line, output the numbers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le d$), which satisfy the condition.

If there are multiple correct answers, any of them are allowed.

It can be shown that the length of the optimal array always satisfies the constraint.

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.

- (37 points): $x, d \le 2 \cdot 10^5$;
- (63 points): without additional constraints.

Examples

standard input	standard output
10 5	2 5 2
11 6	-1
120 6	3 5 4 6

Note

In the first example, $x = 10$ and $d = 5$. You need to find an array with a product of 10. The array "$5, 2$" fits, because $5 \times 2 = 10$ and each number is not greater than d. It is impossible to make an array of size one, because then the only element should be equal to x, and in this test $x > d$.

Problem H. Sets

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

Given numbers n and k.

Let $[n]$ be the set of all numbers from 1 to n.

A set A is a subset of B if for every $a \in A$, a also belongs to B. The empty set ($\emptyset$) is a subset of any set.

It is necessary to find the value of the function $f([n], k)$.

$f([n], 1)$ returns the number of subsets in the set $[n]$.

$f([n], k)$ where $k > 1$ returns the sum $f(s, k-1)$ where s is a subset of $[n]$.

Input

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

Output

It is necessary to output $f([n], k)$. Since the answer may be too large, output it modulo $10^9 + 7$.

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): $k = 1$;
2. (5 points): $n \le 10$, $k \le 2$;
3. (10 points): $n \le 15$, $k \le 3$;
4. (80 points): without additional constraints.

Examples

standard input	standard output
1 1	2
2 2	9
3 3	64

Note

In the first example, the set with 1 element ($\{1\}$) and $k = 1$, so $f(\{1\}, 1)$=2 ($\{1\}$ and $\{\emptyset\}$).

In the second example, the set with 2 elements ($\{1, 2\}$) and $k = 2$. $f(\{1, 2\}, 2) = f(\{1, 2\}, 1) + f(\{1\}, 1) + f(\{2\}, 1) + f(\{\emptyset\}, 1) = 4 + 2 + 2 + 1 = 9$.