Problem D. Sergey and water

Input file:	stdin
Output file:	stdout
Time limit:	2 c
Memory limit:	256 Мб

Sergey has n containers. Each container has a capacity of s liters. Also, Sergey has m bottles of water with volumes a_1, a_2, $\cdots$, a_m litres. Each bottle is completely filled with water.

Sergey can open any bottle and pour its contents into any of his containers. Moreover, if the container is already full while pouring water, the remaining water in the bottle is thrown away.

Sergey wants to know how many containers can be completely filled with water?

You need to help him.

Input

The first line contains following integers: n, s and m ($1 \leq n, s, m \leq 1000$). The second line contains following integers: a_1, a_2, $\cdots$, a_m ($1 \leq a_i \leq 3$).

Output

In a single line print one integer - answer to the problem.

Example

stdin	stdout
10 3 5 3 3 1 2 2	3
10 7 6 3 2 2 2 2 3	2

Problem E. Sergey's game

Input file:	stdin
Output file:	stdout
Time limit:	2 c
Memory limit:	256 Мб

Sergey is playing a game. This game consists of multiple levels. The level is considered passed if the player had pressed b keys on the keyboard. There are p keys on the keyboard. To pass, one can press any keys, the main thing is to press sufficient number of them.

If a player successfully passes the level, he gets as many points as he received at the previous level + 1, with a restriction that a player may not receive more than k points per level (ie if a player has received k points at the previous level and has successfully completed the current one, he will still get k points). In case the player does something wrong (presses less or more keys, than needed), he gets the same amount of points he did on the previous level. Note that in the second case the level is considered passed (but not successfully passed). For the first level, we assume that on the previous level the player has received 0 points. The player can end the game in any moment.

Sergey wonders how many ways there are to play the game to get exactly s points, assuming the first level is always successfully passed.

Two ways are considered different if at some level the player used the different sequence of keys. Just as two ways are different, if they contain a different number of levels passed.

Input

The first line contains integers b, p, k, s ($1 \le k, p, s \le 10^5, 0 \le b \le p$).

Output

Print the remainder of dividing the desired number of ways by the number 1000000007 ($10^9 + 7$) in single line.

Example

stdin	stdout
1 2 2 3	12

Explanation

Example has 12 ways to get the sum 3. Here are some of them: ((1), (1)), ((2), (1)), ((2), (2)), ((1), (1,2), ()), ((2), (), ()). In brackets are the numbers of buttons pressed at the level.

Problem F. Sergey's columns

Input file:	stdin
Output file:	stdout
Time limit:	2 c
Memory limit:	256 Мб

Sergey has n columns. They are all set in rows and have the following heights: $a_1, a_2, \cdots, a_n$. Sergey wants to multiply the height of a certain column by 1 k times, so that value $|\sum_{i=1}^{n-1} a_{i+1} - a_i|$ is minimum.

Help Sergey to find this minimum value.

Input

The first line contains integers n and k ($1 \le n \le 10^5, 0 \le k \le 10^9$). Second line contains n integers $a_1, a_2, \cdots, a_n$ ($0 \le a_i \le 10^9$).

Output

Print the desired value in a single line.

Example

stdin	stdout
6 2 3 4 5 6 7 8	3

Problem G. Sergey's division

Input file:	stdin
Output file:	stdout
Time limit:	2 c
Memory limit:	256 Мб

Sergey believes that an array of n integers $a_1, a_2, \cdots, a_n$ is comparable with the number c, if $(a_1 \cdot a_2 \cdots \cdot a_n) mod\, c = 0$.

Let $f(a, m)$ — be the number of such x $(1 \le x \le m)$ that a array is comparable with number x.

Sergey wants to know the sum of values $f(a, m)$ for all arrays, which length is n, all the elements are integers and $1 \le a_i \le m$ $(1 \le i \le n)$.

Input

The only line contains two integers n and m $(1 \le n \le 10^6, 1 \le m \le 1000)$.

Output

Print the remainder of dividing the answer by 1000000007 $(10^9 + 7)$ into single line.

Example

stdin	stdout
5 3	665

Problem H. Sergey and sequence

Input file:	stdin
Output file:	stdout
Time limit:	2 c
Memory limit:	4 Мб

Sergey has a set of favorite numbers. Once, he took a paper and recorded every favorite number exactly k times. Sneaky Dima chose one of Sergey's favorite numbers and erased several (at least one, but not all) of its entries from the paper.

Sergey asks you to restore the erased numbers.

Help him.

Be careful, this problem has very limited memory limit.

Input

The first line contains integers n and k ($1 \le k \le n \le 3 \cdot 10^6$). The second line contains integers $a_1, a_2, \cdots, a_n$ — the number recorded on paper ($1 \le a_i \le 10^9$).

Output

In a single line print an answer.

Example

stdin	stdout
42 18	528363263
318752492 630995896 557490717	
182588146 174325727 95851943	
318752492 154469437 367325359	
821370300 174325727 154469437	
59827913 36526605 9356383	
545129895	
182588146 557490717 545129895	
367325359 202714501 613423725	
545129895 613423725 630995896	
862808465 124864154 745008828	
202714501 745008828 124864154	
9356383	
545129895 545129895 545129895	
36526605 95851943 821370300	
472683539	
59827913 472683539 862808465	

Problem I. Sergey and exam

Input file:	stdin
Output file:	stdout
Time limit:	2 c
Memory limit:	256 Мб

Sergey is going to pass an exam tomorrow. The exam consist of n questions, each question belongs to one of m topics. Each topic has at least one question. The ticket has m questions, one for each topic. Each question from the topic is chosen randomly.

Sergey knows nothing. He can learn k questions in the last night before an exam.

Now Sergey wants to know: how many ways are there to learn the k questions that to get the greatest score. Score is a number of correctly answered questions from the ticket.

Input

The first line contains the integers n, m, k ($1 \leq n, m, k \leq 1000$). The second line contains integers a_1, a_2, $\cdots$, a_n. a_i — the number of topics of the i question ($1 \leq a_i \leq m$).

Output

In a single line print an answer modulo 1000000007 ($10^9 + 7$).

Example

stdin	stdout
10 3 4	3
1 1 1 2 2 3 3 3 3 3	

Problem J. Sergey and reduction

Input file:	stdin
Output file:	stdout
Time limit:	2 c
Memory limit:	256 Mб

Sergey has an array of n of integers $a_1, a_2, \cdots, a_n$. He wants to be able to respond to two types of queries:

- $0\ l\ r\ e$ — for each i $(l \leq i \leq r)$ execute $a_i = a_i - e$

- $1\ l\ r$ — find out the count of i $(l \leq i \leq r)$, that $a_i \leq 0$

Help Sergey to answer to m queries.

Input

The first line contains two integers n, m $(2 \leq n \leq 10^5, 1 \leq m \leq 2 \cdot 10^5)$. The next line contains n integers $a_1, a_2, \cdots, a_n$ $(0 \leq a_i \leq 10^9)$. The next m lines contains queries, as described in legend. If the query is like $0\ l\ r\ e$, works the following restriction $1 \leq l \leq r \leq n$, $0 \leq e \leq 10^9$. Otherwise, if the query is like $1\ l\ r$, works the following restriction $1 \leq l \leq r \leq n$.

Output

For each query like $1\ l\ r$ print an answer in a separate line.

Example

stdin	stdout
3 6	0
1 2 3	1
0 2 3 1	2
1 1 3	
0 2 2 1	
1 1 3	
0 1 3 1	
1 1 2	

Problem K. Sergey and pattern

Input file:	stdin
Output file:	stdout
Time limit:	2 c
Memory limit:	256 Мб

Sergey has an array of n of integers a_1, a_2, $\cdots$, a_n and a stack.

Sergey can perform two operations:

- take the next number from the array a and add it to the stack

- take number from the top of the stack and write it in the end of new array with deleting from stack

Function $f(a, b)$, where a and b — some arrays of integers n elements equal to the number of operating sequences of length $2 \cdot n$, which is used to build array b from array a.

Sergey has an array of n integers c_1, c_2, $\cdots$, c_n. Some elements of the array are replaced by -1.

You need to calculate the value: $\sum_d f(a, d)$, where d — array, which can be obtained from c after replacement -1 for some positive numbers.

Input

The first line contains an integer n ($1 \leq n \leq 100$). The second line contains n integers a_1, a_2, $\cdots$, a_n ($1 \leq a_i \leq 100$). The third line contains n integers c_1, c_2, $\cdots$, c_n ($1 \leq c_i \leq 100$ *or* $c_i = -1$).

Output

In a single line print the solution modulo 1000000007 ($10^9 + 7$).

Example

stdin	stdout
4 1 10 1 100 1 100 1 10	1
5 1 2 3 4 5 -1 -1 -1 -1 -1	42

Problem L. Sergey and array

Input file:	stdin
Output file:	stdout
Time limit:	2 c
Memory limit:	256 Мб

Sergey has an array of n of integers a_1, a_2, $\cdots$, a_n. He can perform next operations:

- set fix two integers l, r $(1 \leq l \leq r \leq n)$

- increase all a_i by 1 $(l \leq i \leq r)$

Sergey introduced a function $f(a, x)$ — the minimum number of operations to have all the elements of the array a become equal to x.

Sergey wants to find count of arrays a with n length, that consist of non-negative integers not exceeding m, that $f(a, m) \leq k$.

Help Sergey with it.

Input

The single line contains integers n, m, k $(1 \leq$ n,m $\leq 10^4, 1 \leq k \leq 100)$.

Output

In a single line print an answer modulo 1000000007 $(10^9 + 7)$.

Example

stdin	stdout
5 3 4	672