Problem A. Trucks

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

Satal provides consulting services for purchasing trucks in Vladivostok's markets. He receives requests from logistics companies to purchase trucks. Each company has a budget of M rubles, but they always want to maximize the number of trucks.

Lately, the number of requests started to grow rapidly that Satal cannot keep up with them all. Therefore, he asks you to automate the processing of requests from logistics companies.

Input

The first line of the input data contains two integers N and M ($0 < N \le 10^6$, $0 < M \le 10^9$) — the number of trucks on the market and the budget of the request.

The second line contains N positive integers a_i ($0 < a_i \le 10^8$) — the prices of trucks on the market.

Output

Your program should output a single non-negative integer — the maximum number of trucks that can be purchased within the specified budget.

Scoring

Points for each test are awarded independently.

Examples

standard input	standard output
5 5 3 2 1 2 3	3
3 5 1 1 1	3

Note

Each truck can be purchased no more than once.

Problem B. 2025

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

Given some positive integers N and k. Find the minimum integer $M > N$ such that if we remove some digits from its representation, we get k occurrences of the number 2025.

Input

The single input line contains positive integers N and k separated by a space ($0 < N \leq 10^{20000}$, $0 < k \leq 10$).

Output

The program should output the required number M.

Scoring

Points for each test are awarded independently.

Examples

standard input	standard output
327 1	2025
20252025 2	120252025
1999335 1	2000025

Problem C. Yet Another Robin Hood Problem

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

Robin Hood is famous for robbing the rich and giving to the poor. But few know that he is still alive to this day.

In pursuit of justice, he found himself in an elite district of Nottingham, which can be represented as n buildings standing one after another. After thoroughly studying the district, Robin assigned each building its own value a_i. If the i-th building is a police station, which is absolutely forbidden to rob, then $a_i = -1$. Otherwise, the i-th building is a luxurious mansion, robbing which can yield a_i money.

However, the Sheriff of Nottingham is not behind in longevity, and he is here to thwart Robin Hood's plans.

Tonight in this district, Robin Hood and the Sheriff of Nottingham will act. The chronology of events is as follows:

1. First, Robin Hood burns down any police station, after which a_i of the police station becomes equal to 0, and it can be robbed. But note that this action is optional.
2. Then the Sheriff of Nottingham has the opportunity to take money from at most k mansions for safekeeping, after which for each such mansion the equality $a_i = 0$ holds.
3. Finally, Robin Hood can only rob a continuous subsequence of consecutive mansions (since he is tired after many years). Note that the subsequence cannot include a police station that is not burned down.

Robin Hood's task is to rob the largest sum of money, and the Sheriff's task is to minimize this sum. Both "players" act optimally. Determine the sum of money robbed by Robin Hood.

Input

The first line contains two integers n and k — respectively, the number of buildings and the maximum number of mansions whose money the Sheriff can take for safekeeping ($1 \le n \le 10^5$; $0 \le k \le 10^5$). It is guaranteed that k is not greater than the number of all a_i not equal to -1.

The second line contains n integers $a_1, a_2, \ldots, a_n$ — the values of the buildings respectively ($-1 \le a_i \le 10^4$; $a_i \neq 0$).

Output

Output the sum of money robbed by Robin Hood.

Scoring

Points for each subtask are awarded only if all tests for this subtask and necessary subtasks are successfully passed. For some subtasks, it may also be required that all tests from the statement are passed. For such subtasks, the letter S is additionally specified.

№	Additional constraints	Points	Required subtasks	Feedback information
1	$a_i \neq -1$	10	—	first error
2	Exactly one i such that $a_i = -1$	10	1	first error
3	$n \le 3000$	20	S, 1, 2	first error
4	If $a_i \neq -1$ and $a_j \neq -1$, then $a_i = a_j$	30	—	first error
5	No additional constraints	30	S, 1, 2, 3, 4	first error

Examples

standard input	standard output
5 1 1 2 3 4 5	10
5 0 1 2 -1 3 4	10
11 3 1 2 3 -1 3 2 1 -1 2 3 4	6

Note

In the first example, Robin Hood cannot burn down a police station, because there are none. In this case, it is more advantageous for the Sheriff to take the money of the mansion at position 5 for safekeeping.

In the second example, Robin Hood can burn down the police station at position 3, after which he can rob the continuous subsequence $[1, 2, 0, 3, 4]$.

In the third example, if Robin Hood burns down the police station at position 4, then the district transforms into $[1, 2, 3, 0, 3, 2, 1, -1, 2, 3, 4]$. Then the Sheriff can take for safekeeping the money of mansions at positions $3, 5, 11$. The district is transformed into $[1, 2, 0, 0, 0, 2, 1, -1, 2, 3, 0]$. Finally, Robin Hood robs the continuous subsequence $[1, 2, 0, 0, 0, 2, 1]$. It can be shown that when burning down the police station at position 8, the sum robbed by Robin Hood still cannot exceed 6.

Problem D. Déjà Vu

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

Given an array of integers A of length N: $A_1, A_2, \ldots, A_n$.

Define a "left-associative" tower on segment $[L, R]$ as an expression of the form:

$$\left(\ldots \left(\left(A_L^{A_{L+1}} \right)^{A_{L+2}} \right)^{A_{L+3}} \ldots \right)^{A_R}$$

You are given Q queries. Each query contains two integers L and R, and you need to compute the value of the tower on segment $[L, R]$.

Since the value of the tower can be extremely large, you need to compute it modulo M.

Input

The first line contains three integers: N, Q — the length of the array and the number of queries respectively, and the number M ($1 \le N, Q \le 10^5$, $1 \le M \le 10^9$).

The second line contains N integers $A_1, A_2, \ldots, A_n$ ($1 \le A_i \le 10^9$).

The following Q lines contain two integers L and R each — the description of queries ($1 \le L \le R \le N$).

Output

For each query, output one number — the value of the tower on segment $[L, R]$ modulo M.

Scoring

Points for each subtask are awarded only if the solution passes all the tests of that subtask and all required subtasks. Some subtasks may also require that all tests in the statement are completed. For such subtasks, the letter S is additionally specified in the required subtasks section.

№	Additional constraints	Points	Required subtasks	Feedback policy
1	$R - L \le 1$, $A_i \le 100$	5	—	first error
2	$R - L \le 1$	5	1	first error
3	$N, Q \le 1000$, $A_i \le 100$	10	S	first error
4	$N, Q \le 1000$	10	S, 3	first error
5	M is prime	20	—	first error
6	M is a prime power	20	5	first error
7	No additional constraints	30	S, 1, 2, 3, 4, 5, 6	first error

Examples

standard input	standard output
5 5 11 7 1 2 4 4 3 4 5 5 1 1 4 5 2 4	5 4 7 3 1
5 4 14 4 7 7 10 4 2 3 1 3 4 5 1 5	7 4 4 4

Problem E. Volatile Words

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

The year 2100. No one uses search engines anymore, they have been completely replaced by AI chatbots. And life has accelerated so much that words in languages have to be constantly changed to keep up.

Darkhan remains the only search engine developer in the world. He cannot manage to create one of the engine's components — a numbered list of all words from search queries that have been made. Moreover, this list must support two types of operations:

1. The user enters a string v, it is necessary to output the number of words starting with v on the segment of the list from l to r inclusive.
2. The language has changed, it is necessary to add string v to the beginning of the word i.

Help Darkhan, create such a list and perform the operations.

Input

The first line contains one integer n — the number of words in the list ($1 \leqslant n \leqslant 10^5$).

The next n lines contain words: the i-th of them gives a string of lowercase Latin letters s_i ($1 \leqslant |s_i| \leqslant 2 \cdot 10^5$).

Let L_s be the sum of lengths of all s_i. It is guaranteed that $L_s \leqslant 2 \cdot 10^5$.

The next line contains one integer q — the number of operations applied to the list ($1 \leqslant q \leqslant 10^5$).

The next q lines describe operations. The description of each operation has the following format:

- `1 l r v` — count on the segment from l to r the number of words starting with v ($1 \leqslant |v| \leqslant 2 \cdot 10^5$, $1 \leqslant l \leqslant r \leqslant n$). v consists of lowercase Latin letters.
- `2 i v` — add string v to the beginning of the i-th word ($1 \leqslant |v| \leqslant 2 \cdot 10^5$, $1 \leqslant i \leqslant n$). v consists of lowercase Latin letters.

Let L_v be the sum of lengths of all v. It is guaranteed that $L_v \leqslant 2 \cdot 10^5$.

Output

For each operation of type 1, output on a separate line the number of words starting with v on the segment of the list from l to r inclusive.

Scoring

Points for each subtask are awarded only if the solution passes all the tests of that subtask and all required subtasks. Some subtasks may also require that all tests in the statement are completed. For such subtasks, the letter S is additionally specified in the required subtasks section.

№	Additional constraints	Points	Required subtasks	Feedback policy
1	$n, q, L_s, L_v \leqslant 100$	7	S	first error
2	$n, q, L_s, L_v \leqslant 1000$	8	S, 1	first error
3	No operations of type 2	30	—	first error
4	No additional constraints	55	S, 1, 2, 3	first error

Example

standard input	standard output
5 hello world worldwide hola heliobus 7 1 1 5 hel 1 3 5 worl 2 3 ho 1 1 5 ho 2 4 ho 2 5 ho 1 1 5 hoh	2 1 2 2