Dictionary

A friend of yours recently learned about hashing and wants to put his knowledge to the test. For this, he chose a long text T and represented each character of this text by an integer, thus obtaining a sequence T of L integers. A word in the text corresponds to a slice w of this sequence, consisting of n integers, $w[0], w[1], ... w[n-1]$, for any $1 \leq n \leq L$. Your friend has a hash function h that hashes any such word w to the value

$$h(w) = (A^0 \cdot w[0] + A^1 \cdot w[1] + ... + A^{n-1} \cdot w[n-1]) \bmod M$$

for some given constant values of A and M, with M a prime number. It is guaranteed that $M > \max(A, T[i])$ for all i.

To turn this into a game, your friend decided to look for the shortest word w that has a hash value of $h(w) = 0$. He wants to do this in selected parts $T[i, j]$ of the article, where $T[i, j]$ denotes the part of the text from the i-th character until the j-th character, inclusively (where $1 \leq i \leq j \leq L$).

You are asked to write a program to help your friend answer Q such queries.

This is an interactive task. You need to answer the queries one by one as they come.

Input

Your program must read from the standard input.

The first line will contain four space-separated integer numbers A, M, L and Q: the parameters A and M of the hash function, the length of the text and the number of queries that will follow. M is guaranteed to be prime.

The second line will contain the representation of text T, in the form of L space-separated non-negative integers.

Each of the following Q lines will contain two space-separated integers i and j (where $1 \leq i \leq j \leq L$), denoting the query "What is the shortest word w that has a hash value of $h(w) = 0$ in the part of T from the i-th character until the j-th character, inclusively?".

Note again that this task is interactive: until you print the answer for one query, you will not be able to read the next one.

Output

Your program must print Q lines to the standard output, so that the i-th line will contain the answer to the i-th query. The answer to each query will normally consist of two space-separated integers, denoting the beginning and the end of the shortest word found. If more than one shortest words exist, your answer should be the leftmost one. However, in case there is no word with $h(w) = 0$, your program should just print -1 as the answer to that query.

Make sure to flush the standard output after printing the response for each query. Use `fflush(stdout)` or `cout.flush()` in C/C++, `System.out.flush()` in Java, or `Flush(StdOut)` in Free Pascal.

Constraints

- $1 \leq A \leq 10^9$

- $1 \leq M \leq 10^9$
- $1 \leq L \leq 5 \cdot 10^5$
- $1 \leq Q \leq 10^5$
- Time and memory limit: See the CMS.

Subtasks

- Subtask 1 (8 points): $1 \leq Q \leq 5 \cdot 10^3, \quad 1 \leq L \leq 100, \quad 1 \leq M \leq 10^3, \quad A = 1$
- Subtask 2 (18 points): $1 \leq Q \leq 5 \cdot 10^3, \quad 1 \leq L \leq 10^4, \quad 1 \leq M \leq 10^3$
- Subtask 3 (20 points): $1 \leq Q \leq 5 \cdot 10^3, \quad 1 \leq M \leq 10^3$
- Subtask 4 (32 points): $1 \leq Q \leq 5 \cdot 10^3$
- Subtask 5 (22 points): No further constraints.

Example

Input

```
2 7 10 4
1 2 3 4 5 1 2 3 4 5
6 9
6 7
6 10
1 10
```

Output

```
6 9
-1
9 10
4 5
```

Explanation

For the first query, $T[6, 9]$ has a hash value of $0 = (1 \cdot 1 + 2 \cdot 2 + 4 \cdot 3 + 8 \cdot 4) \bmod 7$. There is no shorter word in $T[6, 9]$ with a hash value of 0.

For the second query, there is no word in $T[6, 7]$ with a hash value of 0, so the correct output is -1.

For the third query, $T[9, 10]$ has a hash value of 0 and is shorter than $T[6, 9]$.

For the fourth query, all ranges $T[4, 5]$, $T[5, 6]$ and $T[9, 10]$ have a hash value of 0 and the same minimum length. In this case, we prefer the leftmost one.