Problem H. Holes in Queue

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	1024 mebibytes

A queue is a linear data structure that can either

1. insert an element at the back (push), or
2. delete an element at the front (pop).

However, we misimplemented the pop function. For each pop query, instead of deleting only one element at the front, we simultaneously delete n certain elements from different indices.

Specifically, there are n distinct locations where our pop function deletes its elements: $a_1, a_2, \ldots, a_n$. The queue is indexed from 1 starting at the front, and after each pop query, the remaining elements are renumbered from 1 again.

We are curious what the misimplemented queue will look like after d pop operations.

In order to conduct an experiment, we first pushed infinitely many numbers in the queue starting from 1. So, the initial queue will look like "1 2 3 4 5 6 7 8...".

Then, without further push operations, we will pop the queue d times.

For example, assume the current queue is "1 2 3 4 5 6 7 8...". If we delete the 2nd and 5th element, the queue will change to "1 3 4 6 7 8 9 10...". If we do it again, the queue will become "1 4 6 8 9 10 11 12...". And so on.

We want to process q queries. Each query consists of a single integer x, which means that we need to calculate the number at the x-th position in the queue after d pop operations.

Input

The first line of input contains an integer n ($1 \le n \le 5 \cdot 10^5$).

The second line contains n space-separated integers $a_1, a_2, \ldots, a_n$ denoting the locations we delete for each pop operation ($1 \le a_i \le 10^{12}$; all a_i are distinct).

The third line contains two space-separated integers, q and d, denoting the number of queries and the number of pop operations, respectively ($1 \le q \le 5 \cdot 10^5$; $1 \le d \le 10^{12}$).

Each of the following q lines contains an integer x denoting a query ($1 \le x \le 10^{12}$).

Output

Output q lines, where the i-th line contains a single integer denoting the answer to the i-th query.

Examples

standard input	*standard output*

2
2 5
8 2
1
2
3
4
5
6
7
8
	1
	4
	6
	8
	9
	10
	11
	12

3
7 1 32
8 5
2
8
7
17
26
19
3
1
	8
	18
	17
	27
	39
	29
	10
	6