

Inversion Graph

Input file: **standard input**
Output file: **standard output**
Time limit: 2 seconds
Memory limit: 1024 megabytes

You are given integers N , K , and an integer sequence $D = (D_1, D_2, \dots, D_Q)$ of length Q .

For a permutation $P = (P_1, P_2, \dots, P_N)$ of $(1, 2, \dots, N)$, define an undirected graph $G(P)$ with vertices $1, 2, \dots, N$ as follows:

For each pair of integers (i, j) with $1 \leq i < j \leq N$, there is an edge between vertices i and j in $G(P)$ if and only if $P_i > P_j$.

For each $d = 1, 2, \dots, N - 1$, let \mathcal{S}_d be the set of all permutations P of $(1, 2, \dots, N)$ that satisfy all of the following conditions:

- $G(P)$ is a tree.
- The diameter of $G(P)$ is d .

For each query $q = 1, 2, \dots, Q$, compute

$$\sum_{P \in \mathcal{S}_{D_q}} (\text{LIS}(P))^K \pmod{998244353},$$

where $\text{LIS}(P)$ denotes the length of the longest increasing subsequence of P .

Input

The input is given from Standard Input in the following format:

```
N K
Q
D1
D2
⋮
DQ
```

- All input values are integers.
- $2 \leq N \leq 10^6$
- $0 \leq K \leq 10^{18}$
- $1 \leq Q \leq 2 \times 10^5$
- $1 \leq D_1 < D_2 < \dots < D_Q < N$

Output

Print Q lines in order.

The q -th line should contain the answer for q .

Examples

standard input	standard output
4 0 3 1 2 3	0 2 2
2 100 1 1	1
314159 26535 5 271 828 1828 45904 52353	765557189 351184939 258247317 305813889 68486796

Note

In the first example, the permutations P of $(1, 2, 3, 4)$ such that $G(P)$ is a tree are exactly the following 4 permutations:

- $P = (2, 3, 4, 1)$: the diameter of $G(P)$ is 2, and $\text{LIS}(P) = 3$.
- $P = (4, 1, 2, 3)$: the diameter of $G(P)$ is 2, and $\text{LIS}(P) = 3$.
- $P = (2, 4, 1, 3)$: the diameter of $G(P)$ is 3, and $\text{LIS}(P) = 2$.
- $P = (3, 1, 4, 2)$: the diameter of $G(P)$ is 3, and $\text{LIS}(P) = 2$.

Therefore:

- For $q = 1$, the answer is 0.
- For $q = 2$, the answer is $3^0 + 3^0 = 2$.
- For $q = 3$, the answer is $2^0 + 2^0 = 2$.