Permutations

You are given a permutation $p[1]$, $p[2]$,..., $p[n]$ of the numbers 1, 2, ..., n. You need to answer q queries.

The i-th query (for $i \in \{1, \ldots, q\}$) is described by the numbers $L[i]$ and $R[i]$ ($1 \leq L[i] \leq R[i] \leq n$). The answer to the query is the number of permutations of length n that start with the sequence $p[L[i]]$, $p[L[i]+1]$, ..., $p[R[i]-1]$, $p[R[i]]$ and that, additionally, satisfy the property that the length of their longest decreasing subsequence is at most 2. Since the answers can be very large, output them modulo $10^9 + 7$.

For a sequence $a[1]$, $a[2]$, ..., $a[k]$, the *length of the longest decreasing subsequence* is the greatest integer t such that there are t indices $s[1]$, $s[2]$, ..., $s[t]$ with the properties $1 \leq s[1] < s[2] < \ldots < s[t] \leq k$ and $a[s[1]] > a[s[2]] > \ldots > a[s[t]]$.

Input format

The first line contains the number n.

The second line contains the numbers $p[1]$, ..., $p[n]$, i.e., n distinct integers from the interval $[1, n]$.

The third line contains the number q.

The next q lines specify the queries: the i-th of those lines, for $i \in \{1, \ldots, q\}$, contains the numbers $L[i]$ and $R[i]$.

Output format

For each query, print the number of permutations modulo $10^9 + 7$. Each should be on a separate line.

Input bounds

- $1 \leq n \leq 3 \cdot 10^5$.
- $1 \leq q \leq 3 \cdot 10^5$.

Subtasks

1. (6 points) $n \leq 10$, $q \leq 10$.
2. (7 points) $n \leq 1000$, $q \leq 1000$. Each query contains $p[j] = n$ in its interval.
3. (9 points) Each query contains $p[j] = n$ in its interval.
4. (12 points) $n \leq 1000$, $q \leq 1000$. For each $i \in \{1, \ldots, n\}$, $p[i] = i$, and for each $j \in \{1, \ldots, q\}$, $L[j] = 1$.
5. (18 points) For each $i \in \{1, \ldots, n\}$, $p[i] = i$, and for each $j \in \{1, \ldots, q\}$, $L[j] = 1$.
6. (12 points) $n \leq 1000$, $q \leq 1000$.
7. (36 points) No additional constraints.

Sample test case

Input

```
5
4 2 1 5 3
4
1 1
2 3
2 4
1 3
```

Output

```
4
5
1
0
```

Explanation

For the first query, consider that there are four permutations of the sequence $\langle 1, 2, 3, 4, 5 \rangle$ that start with 4 and have the length of the longest decreasing subsequence at most 2. These are:

- $\langle 4, 1, 2, 3, 5 \rangle$;
- $\langle 4, 1, 2, 5, 3 \rangle$;
- $\langle 4, 1, 5, 2, 3 \rangle$;
- $\langle 4, 5, 1, 2, 3 \rangle$.