# Array and Queries

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Problem Submissions Leaderboard Discussions

Given an array, you are asked to perform a number of queries and divide the array into what are called, *beautiful* subsequences.

The array $A$ has length $n$. A function $f(A)$ is defined to be a minimal possible $x$, such that it's possible to divide array $A$ into $x$ *beautiful* subsequences. Note that each element of an array should belong to exactly one subsequence, and subsequence does not necessarily need to be consecutive.

A subsequence $S$ with length $len$ is called *beautiful* if and only if:

- $len = 1$ or
- Let $S'$ be a sorted version of $S$. It must hold that $S'_i = S'_{i+1} - 1$ for every $i \in [1, len - 1]$.

For instance, if $A = [1, 2, 3, 4, 3, 5]$, $f(A)$ would be $2$. Because, you can divide $A$ into $2$ *beautiful* subsequences either like $[1, 2, 3]$ and $[4, 3, 5]$ or like $[1, 2, 3, 4, 5]$ and $[3]$.

You have to answer $q$ queries. Each query is of the type:

- $id\ val$: you need to change a value of $A_{id}$ to $val$, i.e. $A_{id} = val$. Here $id$ is $1 - indexed$.

After each query, for the value of $f(A)$, lets denote that value as $ans_i$, where $i$ indicates the $i^{th}$ query.

You need to find $\sum_{i=1}^{q} i \times ans_i$ modulo $(10^9 + 7)$.

**Input Format**

The first line contains a single integer $n$, representing the length of array $A$.
The next line contains the array $A$ given as space-separated integers.
The next line contains a single integer $q$, representing the number of queries.
Each of the $q$ lines contain two integers $id$ and $val$, which is described above.

**Constraints**

- $1 \leq n, q \leq 3 \times 10^5$
- $1 \leq A_i \leq 10^9$
- $1 \leq id \leq n$
- $1 \leq val \leq 10^9$

**Output Format**

Print the required answer in one line.

**Sample Input 0**

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

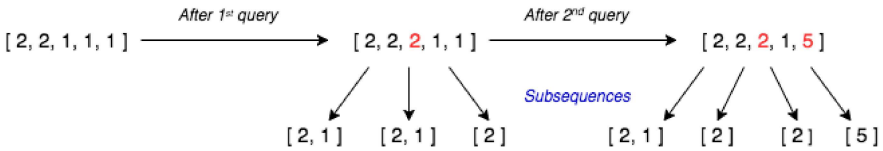
**Sample Output 0**

```
11
```

**Explanation 0**

The initial array $A$ is $[2, 2, 1, 1, 1]$

- After $1^{st}$ query the array becomes $[2, 2, 2, 1, 1]$ this can be divided into $3$ subsequences as $[2, 1]$, $[2, 1]$ and $[2]$.
- After $2^{nd}$ query the array becomes $[2, 2, 2, 1, 5]$ this can be divided into $4$ subsequences as $[2, 1]$, $[2]$, $[2]$ and $[5]$.




Hence, calculating $\sum i \times ans_i$ we get

$$1 \times 3 + 2 \times 4 \Rightarrow 11$$

**Sample Input 1**

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

**Sample Output 1**

```
9
```

**Explanation 1**

The initial array $A$ is $[3, 3]$

- After $1^{st}$ query the array becomes $[3, 4]$ this can be divided into $1$ subsequence as $[3, 4]$.
- After $2^{nd}$ query the array becomes $[5, 4]$ this can be divided into $1$ subsequence as $[5, 4]$.
- After $3^{rd}$ query the array becomes $[5, 2]$ this can be divided into $2$ subsequences as $[5]$ and $[2]$.

Hence, calculating $\sum i \times ans_i$ we get

$$1 \times 1 + 2 \times 1 + 3 \times 2 \Rightarrow 9$$

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Current Buffer (saved locally, editable) Python 3

```python
#!/bin/python3

import sys

def arrayAndQueries(A, queries):
    # Complete this function

if __name__ == "__main__":
    n = int(input().strip())
    A = list(map(int, input().strip().split(' ')))
    q = int(input().strip())
    queries = []
    for queries_i in range(q):
       queries_t = [int(queries_temp) for queries_temp in input().strip().split(' ')]
       queries.append(queries_t)
    result = arrayAndQueries(A, queries)
    print(result)

```

Line: 1 Col: 1

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