Problem Pear trees

Input file `stdin`
Output file `stdout`

Alin wants to start a new life as a farmer in the countryside of Sălaj. He has planted a row of N pear trees, numbered from 1 to N in the order in which they were planted. The pear tree i ($1 \leq i \leq N$) has P_i flowers. Now he is thinking about pollinating the trees by releasing some bees.

Alin studies Q scenarios in which pollination can take place. For each scenario j ($1 \leq j \leq Q$):

- he chooses an interval $[L_j, R_j]$;
- releases the bees at the L_j pear tree;
- the bees will then visit all pear trees to the right, in order, up to the R_j pear tree, including R_j.

The Sălaj pear trees have a special way of interacting with bees:

- if the number of flowers in the currently visited tree, call that number X, has the same parity as the number of flowers in the previous tree, call that number Y, then the number of flowers in the current tree will increase to $X \cdot Y$;
- otherwise, the current tree will bloom Y new flowers, increasing its total to $X + Y$.

For each scenario j ($1 \leq j \leq Q$), Alin wants to know the number of flowers in the R_j-th pear tree at the end of the pollination for this scenario. Since this number may be very large, output it modulo 998 244 353.

Task

Given the number of flowers for each pear tree, compute the result for each scenario modulo 998 244 353.

Input

The first line of the input contains the integer N - the number of pear trees.
The second line of the input contains N integers separated by spaces - the number of flowers in each pear tree.
The third line of the input contains the integer Q - the number of scenarios.
Each of the next Q lines contain 2 space-separated integers - L_j and R_j - the left and right ends for the interval of trees that will be pollinated in the j-th scenario.

Output

The output will contain Q lines. On line j ($1 \leq j \leq Q$), the result for scenario j will be printed.

Restrictions

- $1 \leq N, Q \leq 200\,000$
- $0 \leq P_i \leq 998\,244\,352$ for $1 \leq i \leq N$.
- $1 \leq L_j \leq R_j \leq N$ for $1 \leq j \leq Q$.
- All scenarios are independent

#	Points	Restrictions
1	0	Examples
2	13	$N, Q \leq 1000$
3	14	$P_i \leq 1$
4	8	$N \leq 1\,000$
5	9	The number of flowers in each pear tree has the same parity.
6	56	No further restrictions.

Examples

Input file	Output file
5 4 2 5 7 8 3 1 3 4 5 1 5	13 15 99
3 100000 100000 100000 1 1 3	733427426

For the **first example**, each scenario goes as follows:

- **4 2** 5 7 8 → 4 **8 5** 7 8 → 4 8 **13** 7 8
- 4 2 5 **7 8** → 4 2 5 7 **15**
- **4 2** 5 7 8 → 4 **8 5** 7 8 → 4 8 **13 7** 8 → 4 8 13 **91 8** → 4 8 13 91 **99**

For the **second example**, the answer is 1 000 000 000 000 000, which modulo 998 244 353 is equal to 733 427 426.