Problem H. Excluded Min

Input file:	*standard input*
Output file:	*standard output*
Time limit:	10 seconds
Memory limit:	512 mebibytes

Ferume asked me if I can solve this faster than $O(n\sqrt{n}\log n)$. And it turns out I can! Thanks to him for creating this problem and not letting it live with boring solution.

Let S be a multiset containing non-negative integers. You can do the following operation on S arbitrary number of times (possibly zero): choose x such that there are at least two occurrences of x in S, delete one of the occurrences but insert one occurrence of $(x-1)$ or $(x+1)$ instead (you can insert $(x-1)$ only if it is non-negative). Let $F(S)$ be the maximum mex you can achieve with these operations. Here $\text{mex}(S)$ is the minimal non-negative integer which is not present in S.

You are given an array a of length n and q queries $[l;r]$. For each query, find $F(\{a_l, a_{l+1}, \ldots, a_r\})$.

Input

The first line contains two integers n, q ($1 \le n, q \le 5 \cdot 10^5$) — the size of array and the number of queries.

The second line contains the array of integers $a_1, a_2, \ldots, a_n$ itself ($0 \le a_i \le 5 \cdot 10^5$).

Next q lines contain two integers l_i r_i ($1 \le l_i \le r_i \le n$) — i-th query.

Output

Print answers to queries in the order they are listed in input on separate lines.

Examples

standard input	standard output
3 3 0 0 2 1 3 2 3 3 3	3 1 0
3 2 1 2 2 1 2 1 3	0 3