Min-Max Deque

This is the hard version of the problem. Here, there are updates to the array, and the constraints on Q are $1 \leq Q \leq 2 \cdot 10^5$.

Consider an array A of length N. N is odd.
Alice and Bob will play the following game on it:

- Let B be an initially empty array.
- Alice and Bob take turns playing, with Alice going first.
- On the i-th turn, the current player will choose element A_i, and insert it to either the beginning or the end of B.
  So, Alice will place A_1, then Bob will place A_2, then Alice will place A_3, and so on.
- This continues till all N elements have been placed in B.

Once the game has finished, Alice's *score* is defined to be $\min(B_1, B_N)$.

Alice's objective is to maximize her score, while Bob's objective is to minimize Alice's score.
Define $f(A)$ to be the final score if both players play optimally, for the starting array A.

You are given an array A of length N, where N is odd.
There are Q point updates to the array. Each update gives you two integers p and X, and you are required to set $A_p = X$.

Report the value of $f(A)$ before any updates are performed, and also after each update.
Updates to A are permanent.

Input Format

- The first line of input will contain a single integer T, denoting the number of test cases.
- Each test case consists of multiple lines of input.
  - The first line of each test case contains two space-separated integers N and Q — the length of A and the number of updates, respectively.
  - The second line contains N space-separated integers $A_1, A_2, \ldots, A_N$.
  - The next Q lines describe the updates. Each of them contains two space-separated integers p and X, denoting a point update requiring you to set $A_p := X$.

Output Format

For each test case, output one line containing $Q+1$ space-separated integers: the first integer should be the value of $f(A)$ before any updates, and the i-th of the next Q integers should be the value of $f(A)$ after the first i updates.

Constraints

- $1 \leq T \leq 10^4$
- $3 \leq N \leq 2 \cdot 10^5 - 1$
- N `is odd.`
- $1 \leq Q \leq 2 \cdot 10^5$