

Xorshin

2023/2024 SEASON – FOURTH ROUND



For unknown reasons (definitely not good ones) Bochi decided that he wants to play a GACHA game. He chose Xorshin Impact.

Currently Bochi has n heroes ordered in a line. The hero on position i has power a_i . Bochi needs to complete q missions. Each mission is characterized by the power of its final boss. The final boss of mission j has power b_j . Only m heroes go to every mission so the gold Bochi receives for mission j is $a_1 \text{ XOR } a_2 \text{ XOR } a_3 \text{ XOR } \dots \text{ XOR } a_m \text{ XOR } b_j$ (XOR is the operation Bitwise Exclusive Or).

Because m is the same for every mission, there is another mechanic in the game, allowing a player to change the heroes, going on a mission. By paying some amount of diamonds Bochi can perform the operation $\text{flip}(k)$ choosing a number k . The operation flips the order of the first k heroes as well as the order of the last $n-k$ heroes. After it, the order of the heroes will be $a_k, a_{k-1}, a_{k-2}, \dots, a_2, a_1, a_n, a_{n-1}, \dots, a_{k+2}, a_{k+1}$. The heroes change their positions forever and can only be changed with other flip operations.

Bochi isn't worried about the diamonds he will spend and he asks you for every mission, what is the maximum amount of gold he can win, doing whatever flip operations are necessary.

Input

The first line of the file **xorshin.in** contains n and m – the total amount of heroes and the amount of heroes going on a mission. The next line contains n numbers: a_1, \dots, a_n : the powers of the heroes in their original order. The next line contains q – the amount of missions. The next line contains q numbers: b_1, \dots, b_q : the powers of the final bosses of the missions.

Output

On the only line of the file **xorshin.out** print q numbers: the number on position j must be the maximum gold Bochi can win from mission j .

Constraints

$$1 \leq n, a_i, q, b_j \leq 10^5$$

$$1 \leq m, k \leq n$$

Time Limit: 0.5 sec.

Memory Limit: 256 MB

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Sample Test

Input (xorshin.in)	Output (xorshin.out)	Explanation
5 3 2 3 3 2 1 2 3 4	3 6	<p>If Bochi performs flip(2), the heroes will be ordered like this : 3 2 1 2 3</p> <p>Now the heroes going on mission 1 will have powers 3 2 1 . This will give him 3 gold.</p> <p>After that he can perform flip(1). The heroes will be ordered like this : 3 3 2 1 2</p> <p>Now the heroes going on mission 2 will have powers 3 3 2. This will give him 6 gold.</p>