

F. Xors on Segments

time limit per test: 10 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

You are given an array with n integers a_i and m queries. Each query is described by two integers (l_j, r_j) .

Let's define the function f . The function is defined for only $u \leq v$.

For each query print the maximal value of the function $f(a_x, a_y)$ over all $l_j \leq x, y \leq r_j, a_x \leq a_y$.

Input

The first line contains two integers n, m ($1 \leq n \leq 5 \cdot 10^4, 1 \leq m \leq 5 \cdot 10^3$) — the size of the array and the number of the queries.

The second line contains n integers a_i ($1 \leq a_i \leq 10^6$) — the elements of the array a .

Each of the next m lines contains two integers l_j, r_j ($1 \leq l_j \leq r_j \leq n$) — the parameters of the j -th query.

Output

For each query print the value a_j on a separate line — the maximal value of the function $f(a_x, a_y)$ over all $l_j \leq x, y \leq r_j, a_x \leq a_y$.

Examples

input
6 3 1 2 3 4 5 6 1 6 2 5 3 4
output
7 7 7

input
1 1 1 1 1
output
1

input
6 20 10 21312 2314 214 1 322 1 1 1 2 1 3 1 4 1 5 1 6 2 2 2 2 2 3 2 4 2 5

2 6
3 4
3 5
3 6
4 4
4 5
4 6
5 5
5 6
6 6

output

10
21313
21313
21313
21313
21313
21312
21313
21313
21313
21313
2314
2315
2315
214
215
323
1
323
322