Harbor Life in Jaffa

Input file:	`standard input`
Output file:	`standard output`
Time limit:	10 seconds
Memory limit:	256 megabytes

Aamer immerses himself in the vibrant harbor life of Jaffa, where maritime activity has shaped its identity as a gateway for trade and cultural interaction. Navigating through its bustling waters, Jaffa's strategic importance and historical role as a hub of connectivity come alive amidst the ebb and flow of commerce.

You are given an array a of n integer numbers. You need to process q queries each of which follows one of the following formats:

- $1\ l\ r\ x$. For each integer number a_i where. $(l \leq i \leq r)$, apply $a_i := a_i \& x$, where & is the bitwise AND operator.
- $2\ i\ x$. Apply $a_i := x$.
- $3\ l\ r$. For the subarray $a_l, a_{l+1}, a_{l+2} \ldots a_r$, print the maximum XOR of a subset of integers of the subarray.

A subarray is a contiguous part of the array.

A subset of an array is a tuple that can be obtained from the array by removing some (possibly all) elements of it.

Input

The first line of the input contains a single integer number t $(1 \leq t \leq 10^4)$ — The number of test cases.

The first line of each test case contains two space separated integer numbers n and q $(1 \leq n, q \leq 10^5)$. The number of integer numbers of a and the number of queries, respectively.

The second line of each test contains n space separated integer numbers a_i $(1 \leq a_i \leq 10^5)$, where a_i is the $i - th$ integer number of a.

Each of the following q lines follows one of the following formats.

- $1\ l\ r\ x$ $(1 \leq l \leq r \leq n, 1 \leq x \leq 10^5)$.
- $2\ i\ x$. $(1 \leq i \leq n, 1 \leq x \leq 10^5)$.
- $3\ l\ r$. $(1 \leq l \leq r \leq n)$.

It is guaranteed that the sum of n over all of the test cases does not exceed 10^5.

It is guaranteed that the sum of q over all of the test cases does not exceed 10^5.

Output

For each query of the third type for each test case, print a single line containing a single integer number. The maximum XOR of a subset of integers of the subarray given in the query.

Example

standard input	standard output
1 5 5 4 1 8 9 6 1 1 5 8 3 2 4 2 2 3 3 2 4 3 2 4	8 11 11