Agent 007700 has a tree with vertices and a root vertex with number . In each vertex there is a value - . Unfortunately for him, the DoS (Department of Security) agent Bozhil gained access to it with the aim of sabotage. Events of 2 types occur:

1. with parameters and . Then agent Bozhil changes and its values becomes equal to
2. with parameter . Then agent 007700 wants to find the bitwise “excluding or” (xor) value of the values of and all its direct and indirect ancestors.

**Input**

The first line of the file **xor.in** contains the numbers and . The next line contains numbers - – the values of the vertices. The next lines contain 2 natural numbers each - – the edges of the tree. The next lines contain 2 numbers each -

If , then the query type is and the line contains a third number

If , then the query type is

**Output**

For each query of type 2, print on a new line in the **xor.out** file the answer for that query.

**Constraints**

**Time limit: 0.7 sec.**

**Memory limit: 256 MB.**

**Sample test**

|  |  |
| --- | --- |
| **Input (xor.in)** | **Output (xor.out)** |
| 4 3  1 2 4 8  1 2  2 3  3 4  2 4  1 2 5  2 3 | 15  0 |