Submask Queries

Consider an n-element set, $U = \{1, 2, \ldots, n\}$. Each *subset* $S \subset U$ is assigned a value, $val(S)$. Initially $val(S) = 0$ for all $S \subset U$.

We have three types of queries:

1. `1 x s` : Given an integer, x, and set $S \subset U$, assign a value, x, for all subsets of S (i.e., set $val(T) = x$ for all $T \subset S$).

2. `2 x s` : Given an integer, x, and set $S \subset U$, XOR all values in the subset of S with x (i.e., set $val(T) = val(T) \oplus x$ for all $T \subset S$).

3. `3 s` : Given set $S \subset U$, find and print $val(S)$ on a new line.

in which set s is a binary string of length n where the index of each 1-bit corresponds to the index of an element in U that belongs to set S.

Given n, perform all m queries. For each query of type 3, print the value of $val(S)$ on a new line.

Input Format

The first line contains two space-separated integers describing the respective values of n (the size of set U) and m (the number of queries to perform).
Each of the m subsequent lines contains a query in the form:

1. `1 x s`

2. `2 x s`

3. `3 s`

where s is a binary string (i.e., zeroes and ones) of length n and the index of each 1-bit denotes the index of an element in U to include in subset S.

Constraints

- $1 \leq n \leq 16$

- $1 \leq m \leq 10^5$

- $0 \leq x \leq 2^{30} - 1$ for each query.

Output Format

For each query of type 3, print the answer to the query (i.e., $val(S)$) on a new line.

Sample Input

```
3 4
1 3 110
3 100
2 1 011
3 010
```

Sample Output

```
3
2
```

Explanation

Initially, $val(S) = 0$ for all $S \subset U = \{1, 2, 3\}$. We perform the following sequence of queries:

1. For `1 3 110`, $S = 1, 2$, so we set

$$val(\{1, 2\}) = val(\{1\}) = val(\{2\}) = val(\emptyset) = 3.$$

2. For `3 100`, $S = 1$ so $val(S) = val(\{1\}) = 3$.

3. For `2 1 011`, we xor values $val(\{2, 3\}), val(\{2\}), val(\{3\}), val(\emptyset)$ with $x = 1$ and get

$$val(\{2, 3\}) = 0 \oplus 1 = 1,$$

$$val(\{2\}) = 3 \oplus 1 = 2,$$

$$val(\{3\}) = 0 \oplus 1 = 1,$$

$$val(\emptyset) = 3 \oplus 1 = 2.$$

4. For `3 010`, $S = \{2\}$ so $val(S) = val(\{2\}) = 2$.