Problem I. Interpolate

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

A *Zhegalkin polynomial* is a boolean function $f(x_1, \ldots, x_n)$ which is represented as follows:

$$f(x_1, \ldots, x_n) = \bigoplus_{S \subseteq \{1,2,\ldots,n\}} a_S \cdot \bigwedge_{i \in S} x_i,$$

where $\oplus$ and $\wedge$ stand for XOR and AND boolean operations respectively, XOR is taken over all subsets of variables, and $a_S \in \{0, 1\}$ for each subset S of $\{1, 2, \ldots, n\}$.

In this task you are given m sets of variable values $(v_{i1}, \ldots, v_{in})$ and m boolean values $y_i \in \{0, 1\}$. You have to construct a Zhegalkin polynomial with at most 9000 non-zero terms satisfying $f(v_{i1}, \ldots, v_{in}) = y_i$ for each $i = 1, 2, \ldots, m$.

Input

The first line contains two integers n and m — the number of variables and the number of given variable values ($1 \le n, m \le 2000$).

Each of the following m lines contains a string of n characters 0 or 1 representing the i-th set of variable values, followed by the integer y_i.

It is guaranteed that all sets of variable values are distinct and $y_i = 1$ for at least one set.

Output

Your polynomial has to contain at most 9000 terms having $a_S = 1$. For each such term print its corresponding subset S of variables as a string of n characters 0 or 1 such that i-th character equals 1 if $i \in S$ and 0 otherwise. You can output the terms in any order but there should be no repeating subsets.

If there are multiple possible answers, output any of them. If the solution does not exist, output -1.

It is guaranteed that if the solution exists, then the solution with at most 9000 terms S having $a_S = 1$ exists as well.

Examples

standard input	standard output
2 3 01 1 10 1 11 1	00
3 2 000 0 111 1	100 010 001

Note

One of the possible answers to the first sample is $f(x_1, x_2) = 1$.

In the second sample $f(x_1, x_2, x_3) = x_1 \oplus x_2 \oplus x_3$ is one of the possible answers.