Problem G. LaLa and Divination Magic

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	1024 megabytes

LaLa specializes in divination magic.

Let's say there are M events $E_0, \cdots, E_{M-1}$ that LaLa's interested in forecasting. Each event is associated with one of two outcomes: **catastrophe** or **salvation**.

With a single use of LaLa's divination magic, LaLa obtains the knowledge of one of the following four forms:

1. Knowledge$(i, j, 1)$: either E_i is catastrophe or E_j is catastrophe (possibly both).
2. Knowledge$(i, j, 2)$: either E_i is salvation or E_j is catastrophe (possibly both).
3. Knowledge$(i, j, 3)$: either E_i is catastrophe or E_j is salvation (possibly both).
4. Knowledge$(i, j, 4)$: either E_i is salvation or E_j is salvation (possibly both).

LaLa cast her magic several times, possibly 0, and wrote down all M-tuples of the outcomes of events that are consistent with her knowledge: this is called the **result of the forecasting**. And then, LaLa fell asleep.

When LaLa woke up, she found out that her pet, Leo, ruined all the predictions of her magic. Though LaLa was able to find the result of her forecasting, she is unsure if that data was ruined by Leo as well.

Write a program that determines whether there exists a set of predictions of LaLa's magic whose result of the forecasting matches the one LaLa has, and finds a possible set of predictions if there is one.

Input

The input is given in the following format:

N M
S_0
S_1
$\vdots$
S_{N-1}

where N is the number of outcomes in the result, M of events, and S_i is a binary string of length M where j-th character is '1' if and only if the i-th result forecasts that j-th event will be in salvation.

The input satisfies the following constraints:

- N and M are integers.
- $1 \leq N, M \leq 2\,000$
- $S_i \neq S_j$ for all integers $0 \leq i < j < N$.

Output

If there is no such prediction, the output should be a single integer -1.

Otherwise, the output should be in the following format:

K		
I_0	J_0	t_0
I_1	J_1	t_1
	$\vdots$	
I_{K-1}	J_{K-1}	t_{K-1}

where K is the size of a possible set S of predictions, and, for each $0 \leq i < K$, S contains the prediction Knowledge(I_i, J_i, t_i).

The output should satisfy the following constraint:

- $0 \leq K \leq 2 \cdot M^2$

It can be proved that if there is such a set of predictions, there also is one satisfying the constraint.

Examples

standard input	standard output
2 1 1 0	0
3 3 101 011 111	6 0 2 3 0 1 4 0 2 4 1 2 3 1 2 4 2 2 4