Problem I
Ranks
Time Limit: 3 seconds

A *finite field* $\mathbf{F}_2$ consists of two elements: 0 and 1. Addition and multiplication on $\mathbf{F}_2$ are those on integers modulo two, as defined below.

+	0	1
0	0	1
1	1	0

×	0	1
0	0	0
1	0	1

A set of vectors $\mathbf{v}_1, \ldots, \mathbf{v}_k$ over $\mathbf{F}_2$ with the same dimension is said to be *linearly independent* when, for $c_1, \ldots, c_k \in \mathbf{F}_2$, $c_1\mathbf{v}_1 + \cdots + c_k\mathbf{v}_k = \mathbf{0}$ is equivalent to $c_1 = \cdots = c_k = 0$, where $\mathbf{0}$ is the zero vector, the vector with all its elements being zero.

The *rank* of a matrix is the maximum cardinality of its linearly independent sets of column vectors. For example, the rank of the matrix $\begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 1 \end{bmatrix}$ is two; the column vectors $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ (the first and the third columns) are linearly independent while the set of all three column vectors is *not* linearly independent. Note that the rank is zero for the zero matrix.

Given the above definition of the rank of matrices, the following may be an intriguing question. *How does a modification of an entry in a matrix change the rank of the matrix?* To investigate this question, let us suppose that we are given a matrix A over $\mathbf{F}_2$. For any indices i and j, let $A^{(ij)}$ be a matrix equivalent to A except that the (i, j) entry is flipped.

$$A^{(ij)}_{kl} = \begin{cases} A_{kl} + 1 & (k = i \text{ and } l = j) \\ A_{kl} & (\text{otherwise}) \end{cases}$$

In this problem, we are interested in the rank of the matrix $A^{(ij)}$. Let us denote the rank of A by r, and that of $A^{(ij)}$ by $r^{(ij)}$. Your task is to determine, for all (i, j) entries, the relation of ranks before and after flipping the entry out of the following possibilities: (i) $r^{(ij)} < r$, (ii) $r^{(ij)} = r$, or (iii) $r^{(ij)} > r$.

Input

The input consists of a single test case of the following format.

$$\begin{array}{l} n\ m \\ A_{11} \ldots A_{1m} \\ \vdots \\ A_{n1} \ldots A_{nm} \end{array}$$

n and m are the numbers of rows and columns in the matrix A, respectively ($1 \leq n \leq 1000$, $1 \leq m \leq 1000$). In the next n lines, the entries of A are listed without spaces in between. A_{ij} is the entry in the i-th row and j-th column, which is either `0` or `1`.

Output

Output n lines, each consisting of m characters. The character in the i-th line at the j-th position must be either `-` (minus), `0` (zero), or `+` (plus). They correspond to the possibilities (i), (ii), and (iii) in the problem statement respectively.

Sample Input 1	Sample Output 1
2 3 001 101	-0- -00

Sample Input 2	Sample Output 2
5 4 1111 1000 1000 1000 1000	0000 0+++ 0+++ 0+++ 0+++

Sample Input 3	Sample Output 3
10 10 1000001001 0000010100 0000100010 0001000001 0010000010 0100000100 1000001000 0000010000 0000100000 0001000001	000-00000- 0-00000-00 00-00000-0 +00000+000 00-0000000 0-00000000 000-00000- 0-000-0-00 00-0-000-0 +00000+000

Sample Input 4	Sample Output 4
1 1 0	+