Section: C1 + C2 **Duration: 65 mins + 5 mins (submission)**

Use of STL/library functions is allowed for both problems.

Problem 1

Suppose you are given an nxn fantasy chessboard, where the only available pieces are knights. But unlike the regular chess, you now have k knights in total, each currently occupying a position in the chessboard.

In each move, you can choose a knight and move it from its current position (x, y) to any of the squares (x+1, y+2), (x+1, y-2), (x+2, y+1), (x+2, y-1), (x-1, y+2), (x-1, y-2), (x-2, y+1), (x-2, y-1), and you definitely can't move outside the chessboard. You are allowed to move the knight to a square, which is already occupied by another knight i.e. multiple knights are allowed to share the same square.

Your task is to calculate the minimum number of moves required to place all the k knights on a square.

Input

The first input line has two integers n and k. (n <= 10, k <= n*n)
After this there are n lines of integers describing the chessboard. Each integer is either 0 or 1:
0: No knight
1: Has a knight

Output

Print the minimum number of moves required to place all the k knights on a square. If no such cell exists, print -1.

Sample Input	Sample Output	Explanation
3 3 1 0 1 0 0 0 0 0 1	4	Number of moves required for the top-left knight to reach each cell: 0 3 2 3 -1 1 2 1 4 For the top-right knight: 2 3 0 1 -1 3 4 1 2

		For the bottom-right knight: 4 1 2 1 -1 3 2 3 0 For all the knights: 6 7 4 5 -1 7 8 5 6

Problem 2

Suppose you have discovered an old ancient book, written in a language whose alphabet consists of A-Z. But the order of the letters in that alphabet is not guaranteed to be the same as A, B, C, …, Z.

You have discovered a page in that book, where you found several words and each word is lexicographically sorted. Using this clue, you want to guess a possible ordering of the letters in that mysterious language.

Input

The first input line has one integer n: the number of words. (n <= 1000)
After this, there are n words, each lexicographically sorted following the order of the letters of the mysterious language. The maximum length of a word is 1000 characters, and each character is between A-Z.

Output

Print any valid order that satisfies the lexicographical sorting of the words you found. Your output should consist of only the letters you found in the words.
If there is no possible order, print -1.

Sample Input	Sample Output	Explanation
4 XWY ZX ZXY ZXW	ZXWY	
XWY ZX ZXY ZXW YWWX	-1	The relative order between X-Y, X-W, Y-W cannot be resolved.

Submission Guidelines

1. Create a new folder and name it with your student ID (e.g. 2305001).
2. Copy **only the cpp/java/python files** to the newly created folder.
3. Rename your individual code files as **<ID_ProblemX>.<cpp/java/py>**. For example, if your student ID is 2305001, then for problem 1, the cpp/java/py file must be named 2305001_Problem1.<cpp/java/py>.
4. Zip the folder and name the zip file with your student ID (e.g. 2305001.zip).
5. **Submit the zip file only.**
6. Any violation of these instructions will result in a penalty.