Oil Field (`binaryrectangle`)

Filippo decided to fund a new oil company, and now he is looking for new underground oil fields.

Figure 1: Landscape of Filippo's terrain.

Using a new technology, he has been able to map the underground oil deposits to a matrix of N rows and M columns. Each cell of the matrix contains a value 0 or 1, representing the absence or presence of oil, respectively.

An **oil field** is a rectangular area in the matrix such that each cell in the oil field contains the value 1. An oil field is called **profitable** if it contains *every cell* in the matrix having value 1.

Can you help Filippo by telling him whether the matrix contains a profitable oil field?

> ☞ Among the attachments of this task you may find a template file `binaryrectangle.*` with a sample incomplete implementation.

Input

The first line of the input file contains a single integer T, the number of test cases. T test cases follow.

Each test case consists of:

- a line containing integers N, M, representing a matrix of N rows and M columns.
- N lines, the i-th of which represents the i-th row of the matrix, containing a string of length M made of 0s and 1s.

Output

The output file must contain T lines corresponding to the test cases, each consisting of integer `ans`. The answer for the i-th test case is 1 if the matrix contains a profitable oil field, and 0 otherwise.

Constraints

- $1 \leq T \leq 1000$.
- $1 \leq N \leq 1000$.

- $1 \leq M \leq 1000$.
- The sum of $N \times M$ over all test cases is at most 10 000 000.

Scoring

Your program will be tested against several test cases grouped in subtasks. In order to obtain the score of a subtask, your program needs to correctly solve all of its test cases.

– **Subtask 1** (0 points) Examples.

– **Subtask 2** (50 points) $N, M \leq 20$.

– **Subtask 3** (50 points) No additional limitations.

Examples

input	output
1 5 5 00000 00110 00110 00110 00000	1
5 2 2 11 11 2 3 100 110 3 3 100 000 000 4 4 0000 1101 1101 0000 2 2 00 00	1 0 1 0 0

Explanation

In the **first sample case** the matrix contains a rectangle made of all the 6 cells with value 1.