Maze

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	256 megabytes

Mr. Conical is an avid fan of puzzle games and has a passion for solving all kinds of puzzles. One day, when he wakes up, he finds himself in a grid-like maze with n rows and m columns. In this maze, some of the squares are obstacles and others have a number of gold coins on them. The grid in row i and column j contains $a_{i,j}$ coins, and Mr. Conical can only go from the grid he is currently on to the non-obstructed grid adjacent to the top, bottom, left and right of the grid in each step.

When Mr. Conical moves **from another square** to a particular square (i, j), he can receive $a_{i,j}$ coins. Note that the coins do not disappear, which means that the next time he reaches (i, j), he will again receive $a_{i,j}$ coins. Mr. Conical is now at $(1, 1)$ and has no coins, to escape the maze he must go to (n, m). However, there is a guard at (n, m) who must be given K coins in order to leave the maze.

Mr. Conical is a keen puzzle solver but not a good sport, so he wants to know the minimum number of steps he needs to take to escape the maze.

Input

The first line of the input contains an integer $T(1 \leq T \leq 5)$, representing the number of test cases.

Then T test cases descriptions follow.

For each test case,the first line contains three integers n, m, K - the number of rows and columns of the grid-like maze, and the number of coins that must be given to the guard.It is guaranteed that $n \times m \leq 4000$ and $K \leq 10^9$.

The follows n lines describe the entire maze. For each line there are m integers $a_{i,j}$ $(-1 \leq a_{i,j} \leq 10^9)$. If $a_{i,j} = -1$, it means (i, j) is an obstacle. Otherwise, it means there are $a_{i,j}$ coins on (i,j).

Output

For each test case output a number representing the answer in a separate line.

Example

standard input	standard output
2 3 3 10 0 -1 4 1 2 1 5 -1 0 4 4 1 2 0 -1 0 0 -1 0 -1 -1 7 3 3 1 2 3 0	6 -1