



## 3670 - Patrol Robot

Asia - Hanoi - 2006/2007

A robot has to patrol around a rectangular area which is in a form of  $m \times n$  grid ( $m$  rows and  $n$  columns). The rows are labeled from 1 to  $m$ . The columns are labeled from 1 to  $n$ . A cell  $(i, j)$  denotes the cell in row  $i$  and column  $j$  in the grid. At each step, the robot can only move from one cell to an adjacent cell, i.e. from  $(x, y)$  to  $(x + 1, y)$ ,  $(x, y + 1)$ ,  $(x - 1, y)$  or  $(x, y - 1)$ . Some of the cells in the grid contain obstacles. In order to move to a cell containing obstacle, the robot has to switch to turbo mode. Therefore, the robot cannot move continuously to more than  $k$  cells containing obstacles.

Your task is to write a program to find the shortest path (with the minimum number of cells) from cell  $(1, 1)$  to cell  $(m, n)$ . It is assumed that both these cells do not contain obstacles.

### Input

The input consists of several data sets. The first line of the input file contains the number of data sets which is a positive integer and is not bigger than 20. The following lines describe the data sets.

For each data set, the first line contains two positive integer numbers  $m$  and  $n$  separated by space ( $1 \leq m, n \leq 20$ ). The second line contains an integer number  $k$  ( $0 \leq k \leq 20$ ). The  $i^{\text{th}}$  line of the next  $m$  lines contains  $n$  integer  $a_{ij}$  separated by space ( $i = 1, 2, \dots, m; j = 1, 2, \dots, n$ ). The value of  $a_{ij}$  is 1 if there is an obstacle on the cell  $(i, j)$ , and is 0 otherwise.

### Output

For each data set, if there exists a way for the robot to reach the cell  $(m, n)$ , write in one line the integer number  $s$ , which is the number of moves the robot has to make;  $-1$  otherwise.

### Sample Input

```
3
2 5
0
0 1 0 0 0
0 0 0 1 0
4 6
1
0 1 1 0 0 0
0 0 1 0 1 1
0 1 1 1 1 0
0 1 1 1 0 0
2 2
0
0 1
1 0
```

### Sample Output

```
7
10
```

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