ETH Zurich
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HS 2015
Exercise Sheet 0

ACM Programming Challenges Lab

Exercise 1 – *Stickman*

Two players are playing a game on a given integer matrix with m rows and n columns. At the beginning of the game, a stickman is placed on a cell $(1, 1)$. The players alternate in moving the stickman. A move is consisted of moving the stickman one cell up or one cell right (i.e., either increasing the first or the second coordinate). Additionally, some cells are marked as *jokers*, and a player who moves the stickman to such a cell is awarded with another move. The game ends once the stickman reaches the position (m, n), and the *score of the game (SOG)* is the sum of all cell values on the constructed path from cell $(1, 1)$ to cell (m, n).

The goal of the first player is to maximize the SOG, and the goal of the second player is to minimize it. What is the largest SOG that the first player can guarantee, no matter how the second player plays?

Example In the picture below, shaded cells represent joker cells. Moreover, light arrows are moves of the first player and dark arrows are moves of the second player.

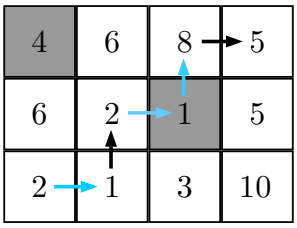

Figure 1: An example of a possible game outcome with SOG= 19 (second sample test case).

Input The first line of the input contains the number of test cases $t \leq 30$. Each of the t test cases is described as follows:

- It starts with a line containing two integers `m n`, separated by space with $1 \leq m, n \leq 100$. Numbers m and n denote the number of rows and columns of the matrix, respectively.
- The following m lines contain n numbers each. The i-th line contain numbers $c_{i,1}, \ldots, c_{i,n}$, with $1 \leq c_{i,j} \leq 100$. Number $c_{i,j}$ denotes the value of the cell with coordinates (i, j).
- The next line contains a single number j, with $0 \leq j \leq m \cdot n$. Number j denotes the number of joker cells.
- The following j lines contain coordinates of the joker cells $p_1, \ldots, p_j$. Coordinates of a joker cell p_i are given as a pair of numbers `x_i y_i` separated by space, such that $1 \leq x_i \leq m$ and $1 \leq y_i \leq n$. It is guaranteed that the cell $(1, 1)$ will never be a joker cell.

Output For every test case, your program should output, on a separate line, a single integer s which denotes the largest SOG the first player can guarantee.

Points There are three groups of test sets, worth 100 points in total.

1. For the first group of test cases, worth 30 points, you may assume that there are no joker cells ($j = 0$) and $m, n \leq 10$.
2. For the second group of test cases, worth 30 points, you may assume that there are no joker cells ($j = 0$).
3. For the third group of test cases, worth 40 points, there are no additional assumptions.

Sample Input

```
2
4 4
1 5 1 1
1 1 5 1
6 6 1 1
6 6 6 1
0
3 4
2 1 3 10
6 2 1 5
4 6 8 5
2
3 2
3 1
```

Sample Output

```
17
29
```