Bloomberg CODECON

Memory Limit: 1024 MB
Time Limit: 5 s

Railforest (100 points)

Introduction

Your country is attempting to modernize its shipping infrastructure to take advantage of a recent free trade agreement. In order to do so the president's economic advisor has decided to carve train tracks through an environmentally delicate valley rainforest so that goods from the north and south can travel over land through your country, bringing valuable funds in the form of lowered tariffs that would still be cheaper than shipping by air or sea. However, the UN does not want you to do this, and will impose a fine for every square kilometer of rainforest that is cleared to make way for the railroad, proportional to how threatened the species that inhabit that square kilometer are.

Your task is to find the cost of the path that results in minimal ecological reparations through a given section of rainforest, so that your president can decide if the economic benefit of building the railway would outweigh the fines levied by the UN.

If you think of the rainforest as an nxm grid of square kilometer units (with n rows and m columns), these tracks need to start somewhere at the ‘top’ (i.e. the 0th row) of the rainforest and end somewhere at the ‘bottom’ (i.e. the nth row) to connect with the rest of your country’s rail infrastructure. Due to the inherent limits of trains, each square kilometer of path must be adjacent (by 8-connection) with another section of the path. Given the dire financial constraints that your country currently faces, you can only afford enough track for n sections of rainforest.

In addition, there are (as a result of a comprehensive study of soil in the rainforest) sections that are marked uncrossable, as the soil simply cannot support the weight of the rails.

Input Specifications

The first line will contain (space separated) integers n and m, and then the next n lines will contain m space separated (usually positive) integers representing the fines associated with each square kilometer. There may also be a few -1’s in there which represent uncrossable sections.

Output Specifications

Simply output the cost of the minimal cost path through the rainforest grid that starts at some point on the top of the grid (i.e. in the first line) and ends at the bottom of the grid (i.e. the nth line). Do not output the path. If the minimal path must go through an uncrossable section, or must go over n sections of railroad to avoid them, (e.g. if two adjacent rows contain only one crossable section each, and these sections are not adjacent) output '-1'.

Sample Input/Output

Input

```
4 5
3 4 2 8 4
1 2 5 -1 1
4 2 8 2 3
7 8 3 2 1
```

Output

8

Explanation

The minimal cost path is to go from the rightmost cell,down one, then down to the left, then down to the right

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Input

```
4 4
2 1 3 4
3 -1 -1 -1
-1 -1 2 -1
2 3 0 2
```

Output

```
-1
```

Explanation

There is no path that meets the 8-connectivity requirement and doesn't go through an uncrossable section.