Computer Science 320SC – (2019)

Programming Assignment 1

Due: Saturday, August 10

Requirements

This first assignment lets you get familar with submission of a simple (but correct and efficient) algorithm to the CompSci 320 automated marker. This assignment tests your ability to process and model input for a real-world-like problem. You should already have sufficient algorithmic skills from the prerequisite course CompSci 220 to complete this assignment.

It is worth 5% of your total course marks. (Note future programming assignments will require much more work to obtain the same number of marks so you are encouraged to make a serious attempt on this one.)

Problem: Shortest Cost Route to Navigate a Grid

Consider a grid where each cell has a different cost to travel across the regions. Assume we can only travel and stop in straight lines between the corners of these cells. Note that the cost to travel along a border between two cells is the cheapest of the two. We want to find the cheapest route from the lower-left corner to the upper-right corner of the grid under these constraints.

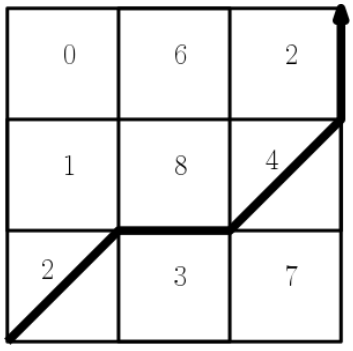
For example in the following 3×3 grid, one of the cheapest routes of cost 2+3+4+2=11 is highlighted.

We will read in a sequence of problem instances. The first line will contain two positive integers n and m, both at most 400, denoting the dimensions of the grid; here the number of rows is n and the number of columns is m. We then are given n lines of m non-negative integers representing the costs for the cells. All integers will be separated by spaces. The last problem instance will have values of $n = m = 0$, which is not processed.

The input should be taken from keyboard/stdin/System.in.

Sample Input:

```
3 3
0 6 2
1 8 4
2 3 7
3 5
1  3 9   9 1
5 10    1 8 4
 2 7 8 2   6
0   0
```



The output for each instance should be a single integer (one per line) denoting the minimum cost to travel. Print these to the console/stdout/System.out.

Sample Output:

```
11
17
```

Submission

For this assignment you need to submit a single source program. There will be three test cases of increasing difficulty. You can resubmit up to 10 times to http://www.automarker.cs.auckland.ac.nz/. There are two marks awarded for test cases 1 and 2 and one mark awwarded for test case 3.