

CSE 214
Homework #5
Graphs

Submission guideline:

Submit the homework through blackboard. Before submission make sure your codes do not have any error, unexecutable code and/or late submission will not receive any credit. Submit your Java code (.java files only) as a single .zip archive. Include a README text file to give the TA's instructions on how to run your code. The .zip file name should be in the

following format: < firstname >_< lastname >_< id >_hw< num >.zip

For example, if John Doe with student ID 123456789 is submitting the third homework, the submitted file should be named john_doe_123456789_hw3.zip

Total Marks: 50

Homework posted on: November 26, 2017

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Prison Break

John was a prisoner in Alcatraz. He was a witty and intelligent guy, who was confident of escaping prison. After few days of observation, he figured out that the prison consists of $(N \times N)$ cells, i.e. the shape of prison was $(N \times N)$ matrix. Few of the cells of the prison contained motion detectors. So, John planned that while escaping the prison he will avoid those cells containing motion detectors. Yet before executing his plan, John wants to know the total number of unique possible paths which he can take to escape the prison. Initially John is in cell $(0, 0)$ while the exit of the prison is at cell $(N-1, N-1)$.

Help John to find the total number of unique possible paths to escape the prison avoiding the motion detectors.

Note: John can move in four directions [if his current location is (X, Y) , he can move to either $(X+1, Y)$, $(X-1, Y)$, $(X, Y+1)$, $(X, Y-1)$]. If the first cell $(0, 0)$ and the last cell $(N-1, N-1)$ contain motion detectors, then John can't break out of the prison.

INPUT:

Take input from a file in1.txt. The first line contains number of test cases T . T test cases follow. The first line of each test case contains an integer N , (i.e. the size of the $(N \times N)$ matrix). The next N lines contain N space separated values either 0 or 1. 1 represents a cell containing motion detectors and 0 represents a cell containing no motion detectors.

OUTPUT:

Output total number of unique possible paths which he can take to escape the prison. If John cannot break out of the prison then the answer is 0.

Constraint:

$$1 \leq T \leq 20$$

$$1 \leq N \leq 20$$

Expected Time Complexity:

$$O(n^2)$$

Sample Input

```
3
4
0 1 1 0
0 0 1 0
0 0 0 0
0 1 1 0
4
0 0 0 1
0 0 0 0
1 1 1 0
1 0 0 0

4
0 1 1 0
0 0 1 1
0 0 0 0
0 1 0 0
```

Sample Output

```
2
4
4
```

Hint: Use DFS

Grading Rubrics:

- (1) Your code will be tested for 10 test cases. Each test case has 5 points. You will lose points for failing test cases.
- (2) Unexecutable code will receive 0.
- (3) If the complexity of your code is more than what is expected you will lose 50% marks (the complexity of reading input from file or from console is not included).
- (4) Not following the guideline for naming your zip file correctly will cost you 5 points.
- (5) Try opening and extracting your zip files before submitting. If your zip file doesn't open after submission, you won't be graded.
- (6) **No late submissions or email submissions** will be accepted for this assignment, so make sure to submit the assignment well before the deadline.
- (7) We will check your code for plagiarism, if you are caught for copying code you will get 0 and a warning (for the first time). If you are caught for plagiarism twice you will be charged for academic dishonesty.