STAGE
Competitive Programming Test

End Stage

Questions

1. Virus Transmission ()

Note:

- You can do multiple submissions.

- Your highest score will be considered

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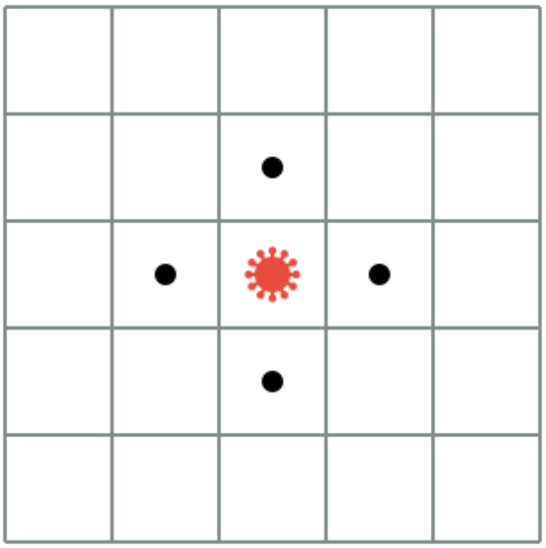
Virus Transmission

You're given a rectangular petri dish divided into `m` rows, `n` columns, each subdivision containing cells or left empty. Cells can be infected (`0`), weak (`1`), strong (`2`) or empty (`_`). An infected cell can infect adjacent healthy (both weak and strong) cells. Once adjacent to the infected, it takes a day for a weak cell to get infected and be able to transmit the virus, and two days for a strong one. The objective is to find the number of days required to infect all weak and strong cells.

A subdivision can have a maximum of 4 adjacent subdivisions as show below. Infected cell is shown in red and it's adjacent 4 cells are shown by black dots.



Input Format

The first line contains and integer `t` denoting the number of test cases. The second line consists of two space separated integers `m` and `n`. The next `m` rows each contain `n` characters.

Output Format

For each test case output the number of days required. If it's not possible to turn all healthy cells to infected, output `-1`. If there are no healthy cells output `0`.

Sample Input

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```
02_20
21212
_121_
__2__
3 3
_1_
101
_1_
2 3
1_2
_0_
1 2
0_
```

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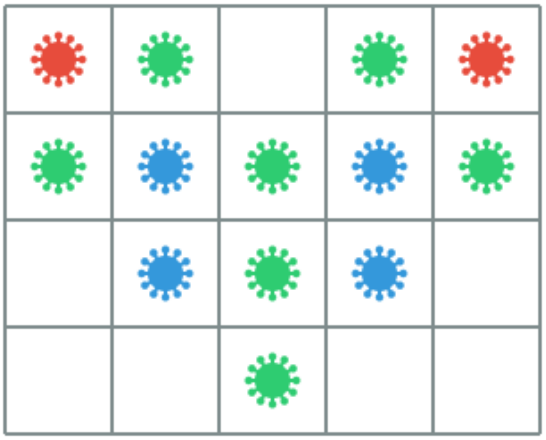
Sample Output

```
8
1
-1
0
```

Explanation

For test case



After Day 1

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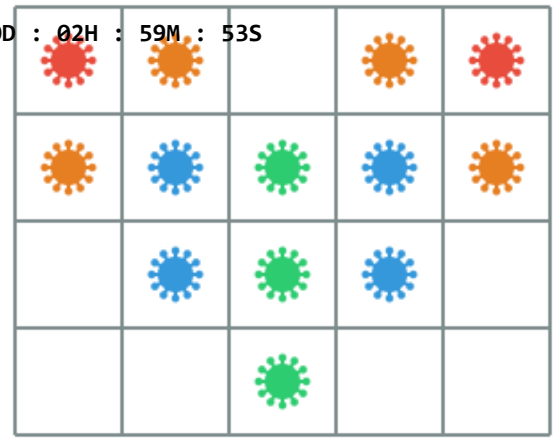
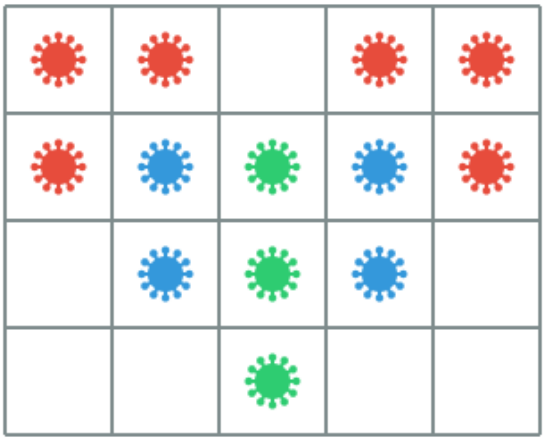


After Day 2



After Day 3

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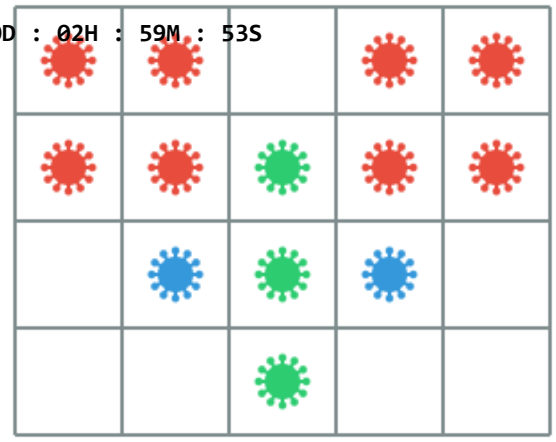
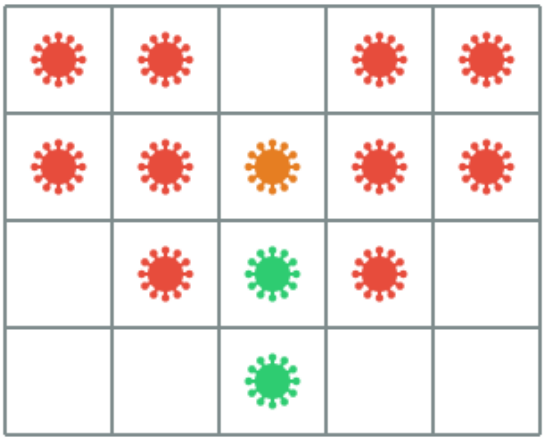


After Day 4



After Day 5

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Questions

1. Virus Transmission ()

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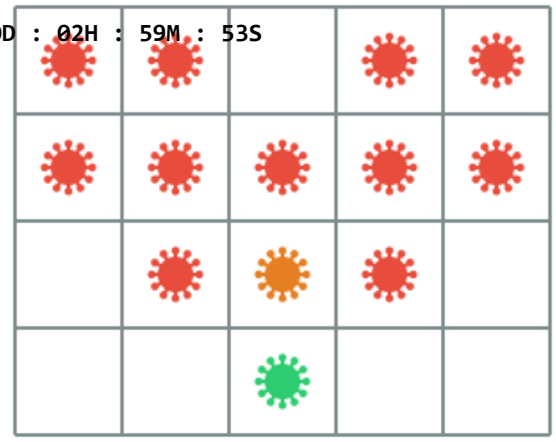
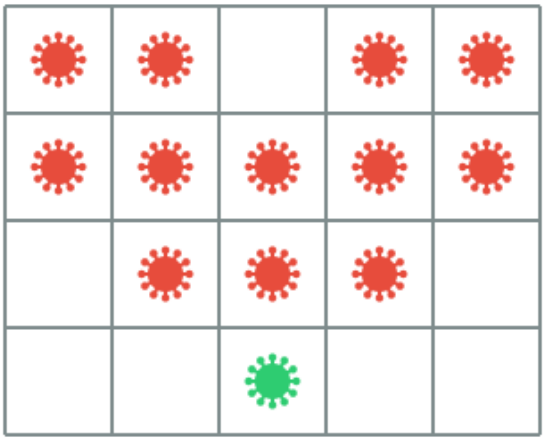


After Day 6



After Day 7

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Questions

1. Virus Transmission ()

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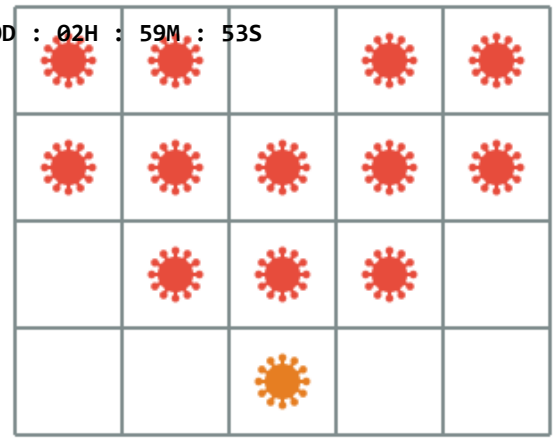
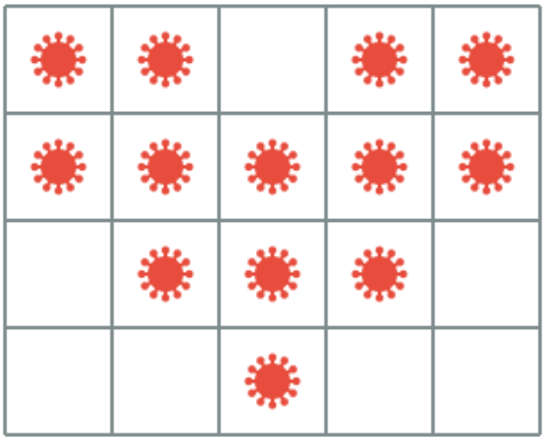


After Day 8



It takes a total of 8 days.

Infected cell is shown in red, weak in blue and strong in green. Intermediate state of a strong cell after first day of infection is shown in orange.

Constraints

1 <= t <= 1000
1 <= m,n <= 100

Environment

Read from STDIN and write to STDOUT.

Please check the sample programs below which print the sum of two numbers received as input

- C goo.gl/4zRfEC (https://goo.gl/4zRfEC)
- C++ bit.ly/2Io1VND (https://bit.ly/2Io1VND)

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(small case)

- Python2 bit.ly/2T1TGu4 (https://bit.ly/2T1TGu4)
- Python3 bit.ly/2AsphPm (https://bit.ly/2AsphPm)

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Instructions

- The dashboard provides two modes.
  - Test runs your code against public/sample test cases.
  - Submit runs against private/hidden ones.
- Only public/sample test cases and their elaborate "test" results are made available. A line by line comparison with expected output is shown. There is no score for passing the public test cases. It's only for testing and debugging.
- For the private/hidden test cases, the judging system only shows the exit code, passed status, time consumption, memory consumption and score. We expect users to take cues from these values. Only making a "submit" will yield a score. Total score is a normalized weighted score over all test cases.
- If the code reaches execution time limit and it still running, it is terminated and a timeout is declared.
- Use the help button

SAMPLE STDIN 1 (https://cdn.skillenza.com/files/ef987377-1f7a-4702-aecb-cb999f2[illegible]568/in.txt)

```
42
4 5
02_20
21212
_121_
__2__
3 3
```

SAMPLE STDOUT 1 (https://cdn.skillenza.com/files/9[illegible]327b-4206-aaa4-0557dc[illegible]8bd9/)

```
8
1
-1
0
16
6
-1
```

Upload solution to editor

Select language

```
1
```

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Test Submit