


# Problem 1: The Construction Campaign (15 points) [Codeforces]

By Arya Maheshwari

The University's most expansive construction project is underway, and the administration needs you to help them figure out how to do as much construction as possible under certain constraints.

Campus is represented by a $N$ by $M$ grid, which we'll denote $G$. Each cell of the grid $G$ represents a region of the university and is labeled with an uppercase letter, where we'll denote the letter at a grid cell $(r, c)$ (i.e. at row $r$, column $c$) as $G(r, c)$. Students can walk between two regions of the university if they are adjacent cells in the grid—either vertically, horizontally, or diagonally. Meanwhile, the University can also do a construction project between any two adjacent cells in the university, according to this same definition of adjacency. If the University does construction between two adjacent regions of campus, students can no longer walk between those two regions.

The University gains $D((r_1, c_1), (r_2, c_2))$ utility for doing a construction project between cells $(r_1, c_1)$ and $(r_2, c_2)$, where the function $D$ is given by the distance between the letters $G(r_1, c_1)$ and $G(r_2, c_2)$, **plus 1**. (Note again that the two cells must be adjacent for construction to be possible in the first place.) For example, if $G(1, 0) =$ 'B' and $G(1, 1) =$ 'F', then $D((1, 0), (1, 1)) = 4 + 1 = 5$ (where the 4 comes from the distance, essentially an absolute value of "difference," between the letters 'B' and 'F'). Observe that this distance is always a positive integer, so the University gains utility from any possible construction project.

The University wants to maximize its utility by doing as much construction as possible, but campus inhabitants have rioted and instituted one condition: students must always be able to reach any point on campus from any other point on campus (at least in some indirect way, i.e. even if it requires walking through more regions of campus than before).

The University has tasked you to determine the following: what is the maximum amount of utility they can gain by doing construction projects while still meeting the students' requirement?

**Input:** The first line contains two space-separated integers, $N$ and $M$ (in that order), where $N$ is the number of rows and $M$ is the number of columns in the grid that represents the University.

The next $N$ lines (lines 2 through $N+1$) contain $M$ space-separated uppercase English letters, where the $i$th line ($2 \leq i \leq N+1$) represents the $M$ letter labels (as described in problem statement above) of the $i$th row of the University.

**Output:** A single integer representing the maximum utility the University can obtain.

**Constraints:** $2 \leq N, M \leq 200$. All labels (the values in the grid) are English uppercase letters.

### Example 1

Input

```
2 2
C C
C C
```

Output

```
3
```

Explanation: Note that he university has 6 possible pathways (corresponding to the 6 pairs of cells) to try to do construction on, and each of these yields the same utility of 1 (the distance between 'C' and 'C' is 0, and so the utility gained is 1 more than that per the definition of utility). It's possible to pick at most 3 pairs of cells to do construction on such that students can still move between all 4 cells, so the maximum utility of the university is 3.




### Example 2

Input

```
2 3
A G E
B D A
```

Output

```
33
```