Radio towers

You are taking a military-grade supercomputer back to naval base "Janet" for prompt shipment back to your country's intelligence headquarters. This would be a simple transport that would have been very easy to complete undetected if it weren't for the strength of the computer itself: the computer, even when "shut off", releases a strong electrical field easily detected by radio towers. As you are deep in enemy territory, you can rest assured that the opposing government has sent out orders to their communications department to be on the lookout for any signs of irregularity, especially if it means gathering intel on your country's government. You will thus do your best to make it back to base "Janet" while staying as far as possible from all radio towers.

Formally, the map you're going to use is an **N** by **M** grid such that **N** and **M** ($1 \le N, M \le 500$), where a cell marked with the letter "V" is your initial position, a cell marked with the letter "J" is base "janet", a cell marked with a plus sign "+" contains a radio tower, and a cell marked with a dot "." is empty. The movements you are allowed to make are to the cells directly adjacent to your current one, that is towards the north, south, east and western cells. You are allowed to go under towers (therefore towards cells marked with "+").

For security reasons, when you received the computer, the naval base communicated an order: you must calculate the minimal distance between you and a tower throughout the entirety of your (presumed to be optimal) path and report it on arrival. They have also specified that your path also includes the naval base, so its distance from the nearest tower must also be factored in the calculations. The base opted for manhattan distance as a measurement: At any given moment, your distance from any tower positioned at **(xt, yt)** if you occupy the cell positioned at **(xp, yp)** is **d = |xp - xt| + |yp - yt|**.

Determine the minimum distance between you and any of the towers at any given moment (including at the start and when you reach the naval base) assuming you take a path that maximizes said minimum distance at all times.

Examples

Example 1

Input:

```
4 4
+...
....
....
V..J
```

Output:

```
3
```

Example 2

Input:

```
4 5
.....
.+++.
.+.+.
V+.J+
```

Output:

```
0
```

Explanation of test cases

In the first example, the most optimal path is directly from "V" to "J", and the minimum distance is 3 at the start, and no lower, so the program should return 3.

In the second example, there is no path which does not involve going under a radio tower, so the distance is 0 at some point, which is the minimum for all distances. The program should then return 0.