

Problem A

Storing Eggs

You have an egg carton that can be represented as a $3 \times N$ grid. The grid consists of 3 rows, numbered from 1 to 3, and N columns, numbered from 1 to N . The cell at row r and column c is denoted as (r, c) . Each cell can be either usable or unusable; each usable cell can only hold at most 1 egg while unusable cells, as the name implies, cannot be used.

You want to put exactly K eggs into usable cells of your carton such that the distance between any two closest eggs is maximized. The distance between an egg in cell (r_1, c_1) and another egg in cell (r_2, c_2) can be calculated using Euclidean distance, i.e. $\sqrt{(r_1 - r_2)^2 + (c_1 - c_2)^2}$.

Determine the maximum possible distance between any two closest eggs, or determine if it is impossible to put K eggs into your carton.

Input

Input begins with two integers N K ($1 \leq N \leq 100$; $2 \leq K \leq 3N$) representing the number of columns of your egg carton and the number of eggs. Each of the next 3 lines contains a string S_r of length N that consists of either character '.' or '#'. The c^{th} character of string S_r represents the condition of cell (r, c) of the carton. Cell (r, c) is usable if $S_{r,c} = '.'$ and unusable if $S_{r,c} = \#$.

Output

If K eggs can be put into your carton, then output a real number in a single line representing the maximum possible distance between any two closest eggs. Your answer is considered correct if its absolute or relative error does not exceed 10^{-6} .

If K eggs cannot be put into your carton, then output -1 in a single line.

Sample Input #1

```
5 2
#....
.....
....#
```

Sample Output #1

```
4.472136
```

Explanation for the sample input/output #1

The maximum distance between any two closest eggs can only be achieved by putting the eggs in cells $(3, 1)$ and $(1, 5)$, where the distance between the two (closest) eggs is $\sqrt{20}$.

Sample Input #2

```
5 6
##.##
#####
.....
```

Sample Output #2

```
1.000000
```

Explanation for the sample input/output #2

There is only one way to put 6 eggs into the carton; the distance between the two closest eggs is 1.

Sample Input #3

```
3 4
..#
...
...
```

Sample Output #3

```
1.414214
```

Explanation for the sample input/output #3

The maximum distance between any two closest eggs can be achieved by putting the eggs in cells (1, 1), (3, 1), (3, 3), and (2, 2). In this arrangement, the distance of the two closest eggs is $\sqrt{2}$, e.g., between eggs in cells (1, 1) and (2, 2).

Another way to put the eggs while getting the same answer is by putting the eggs in cells (1, 2), (2, 1), (2, 3), and (3, 2).

Sample Input #4

```
2 6
..
.#
..
```

Sample Output #4

```
-1
```

Explanation for the sample input/output #4

There are only 5 usable cells, thus, it is impossible to put 6 eggs into the carton.