[CS 11] Prac 6m – Bouncing Billy

Problem Statement

Billy the Mouse has a very simplistic movement.

We can model the area where Billy moves in as an $r \times c$ grid—that is, a grid with r rows and c columns. We label the rows 0 to $r-1$ and columns 0 to $c-1$, and label the cell on row i and column j as (i, j).

Billy is currently at cell $(0, 0)$ and is walking southeast. Every second, he moves to the next cell over. For example, the next one from $(0, 0)$ is $(1, 1)$. This continues every second until Billy hits a wall, in which case Billy changes direction. The direction changes as if Billy "bounced" on the wall, e.g.,

```
.*.*.
..*..
#####
```

or

```
#..
#.*
#*.
#.*
#..
```

If Billy hits a corner, his direction turns the opposite way:

```
.*..#
..*.#
...*#
#####
```

Given r, c as well as the number of seconds s, can you illustrate the trajectory of Billy?

Task Details

Your task is to implement a function called `billy_movement`. This function has three parameters `r`, `c` and `s`, all `int`s, as described in the statement.

The function must not return any value. It must print its output as r lines, each containing c characters. Each line represents a row, and each character represents a cell as follows:

- `*` if Billy visited the cell in the first s seconds.
- `.` otherwise.

Restrictions

(See 6a for more restrictions)

For this problem:

- Loops and lists are allowed.
- Up to 16 function definitions are allowed.
- Recursion is **disallowed**. (The recursion limit has been greatly reduced.)
- Sets and dictionaries are allowed.
- Generators and comprehensions are allowed.
- The following names are allowed: `set`, `dict`, `iter`, `next`, `any`, `all`, `popitem`, `setdefault`, `update`, `add`, `discard`.
- The source code limit is 1000.

Example Calls

Example 1 Function Call

```
billy_movement(4, 6, 6)
```

Example 1 Output

```
*...*.
.*...*
..*.*.
...*..
```

Example 2 Function Call

```
billy_movement(3, 5, 20)
```

Example 2 Output

```
*...*
.*.*.
..*..
```

Example 3 Function Call

```
billy_movement(3, 6, 20)
```

Example 3 Output

```
*.*.*.
.*.*.*
*.*.*.
```

Constraints

- The function `billy_movement` will be called at most 12 times.
- $2 \le r, c \le 250$
- $0 \le s \le 10^{10}$

Scoring

- You get 100 ❤️ points if you solve all test cases where:
  - $s \le 50{,}000$
- You get 50 ❤️ points if you solve all test cases.

Clarifications

Report an issue

No clarifications have been made at this time.

Submit solution [CS 11] Practice 6 ❤️

My submissions ❤️

Points: 150 (partial)

Time limit: 6.0s

Memory limit: 1G

Author: kvatienza (Kevin Atienza)

Problem type

Allowed languages ~~NONE~~, py3