Coding Quiz Assignment 2

Find x in Infinite Array - 10 Points

In this assignment you will use the provided code template to implement a working solution to [DPV] 2.16:

> You are given an infinite array $A[\cdot]$ in which the first n cells contain integers in sorted order and the rest of the cells are filled with ∞. You are not given the value of n. Describe an algorithm that takes an integer x as input and finds a position in the array containing x, if such a position exists, in $O(\log n)$ time.

Your code is prohibited from directly accessing $A[\cdot]$ - the template provides the following:

- **findX.start()** - initialize the problem space and return the value x
- **findX.lookup(index)** - return the value of $A[index]$, or ***None*** if $index > n$
- **findX.lookups()** - return the number of calls to **findX.lookup()**

Please note that the range of values for $A[\cdot]$ is $[1..\infty]$, and that x is guaranteed to exist in $A[\cdot]$ The number of calls to findX.lookup() will be strictly limited. Exceeding that limit will throw an exception. The successful execution of your solver should print the index where x is found within $A[\cdot]$ and the number of lookups required to find x:

```
findX result: x found at index 9549 in 32 calls
```

You may also change the random seed to evaluate your algorithm:

```
$python3 findX.py -s 123456
```

Restrictions

- You must complete this assignment on your own; do not share your code with anyone and do not copy code from the Internet
- You must be fully compatible with **python (3.6.x)**
- No additional libraries may be imported beyond what is provided in the assignment
- Do not modify the structure or program-flow of this assignment in any way – only add code where directed to do so by the code comments. Do not add functions, variables, or other code constructions except where told to do so.

Rubric

You will receive 2 points for passing the Base Case using the default seed, and the Autograder will confirm this upon submission. Your solution will be tested against four additional seeds: each test will be worth 2 points.

Submission

Submit your code file (**findX.py**) ONLY to the Gradescope assignment on or before the posted due date. Do not submit a zip file, or any other files but **findX.py**. Late submissions will not be accepted, NO EXCEPTIONS!