[CS 11] Prac 10c – Gas Right

Problem Statement

Road trip!

You have a long drive ahead, and you're worried that you'll run out of gas. Luckily, there are several gas stations along the road.

We can model the road as a number line, with the positive direction in the number line corresponding to the *rightward* direction. We assume that you're going from left to right.

There are n gas stations from various companies located along this number line. Because you are worried about running out of gas, you want to know the nearest location ahead of you. Of course, you do not want to waste time, so you don't care about gas stations behind you.

Suppose you are at location x. What is the nearest gas station strictly to the right of x? If there is no such gas station, say so as well.

Furthermore, because you'll be frequently asking this question during the trip, you want to answer this question q times, for various values of x.

Task Details

Your task is to implement a function called `gas_stations`. This function has two parameters:

- the first parameter is a `dict` of size n whose keys are `int`s and whose values are `str`s. Each key represents a location in the number line with a gas station, and the corresponding value is the company owning that gas station.
- the second parameter is a `tuple`/`list` of q `int`s, each representing a query value x.

The function must return a `list` of length q denoting the answers to the queries in the order they appear in the input. Specifically, for each query value x, the corresponding element in the output should be either:

- a `str` naming the company owning the closest gas station strictly to the right of location x, or
- `None` if there is no such gas station.

Restrictions

(See 10a for more restrictions)

For this problem in particular:

- The source code limit is 2000.

Example Calls

Example 1 Function Call

```
gas_stations({
    555: 'Caltech',
    241: 'Shill',
    214: 'Shill',
    143: 'Caltech',
    69: 'Patron',
    420: 'Patron',
    42: 'Shill',
}, (314, 42, 32, 2048, 64, 42, 101))
```

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Example 1 Return Value

```
[
    'Patron',
    'Patron',
    'Shill',
    None,
    'Patron',
    'Patron',
    'Caltech',
]
```

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Constraints

- The function `gas_stations` will be called at most $1{,}000$ times.
- $0 \le n \le 250{,}000$
- $0 \le q \le 250{,}000$
- The sum of ns across all calls will be $\le 250{,}000$.
- The sum of qs across all calls will be $\le 250{,}000$.
- Each location and query value is an integer with absolute value at most 10^{10}.
- Each company name is a nonempty string of up to 7 English letters.

Scoring

- You get 60 ❤️ points if you solve all test cases where:
  - $n \le 50$
  - $q \le 50$
  - The sum of the ns across all calls will be 500.
  - The sum of the qs across all calls will be 500.
- You get 60 ❤️ points if you solve all test cases where:
  - $n \le 4{,}000$
  - $q \le 4{,}000$
  - The sum of the ns across all calls will be $8{,}000$.
  - The sum of the qs across all calls will be $8{,}000$.
- You get 65 ❤️ points if you solve all test cases.

Submit solution [CS 11] Practice 10 ❤️

My submissions ❤️

Points: 185 (partial)
Time limit: 4.0s
Memory limit: 1G

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Problem type

Allowed languages ~~NONE~~, py3

Clarifications

Report an issue

No clarifications have been made at this time.