Smallest missing number in linear runtime

Challenge assignment for Computer Programming, week 2

Given an unsorted vector of integers, find the lowest possible value missing in the vector that is larger than the smallest value that is present in the vector. Write a program that first reads from the user the number of values in the vector, followed by the vector's numbers. The program then outputs the smallest missing number.

For reading the numbers, you can start from the code template.

Here are some correct example runs of the program:

```
How many numbers? 5

Please enter the numbers 1 2 -7 -6 3

The smallest missing number is -5


How many numbers? 3

Please enter the numbers 1 2 3

The smallest missing number is 4


How many numbers? 4

Please enter the numbers 4 2 1 0

The smallest missing number is 3
```

There are many solutions possible to this problem, some are more efficient than others. For this challenge, your program is supposed to run in linear runtime, this means you can not, for example, sort the vector. Roughly speaking, your code should take one or a few passes over the data. It is OK if (and likely that) you will need an additional data structure (like a helper vector) for this.