



Counting Mushrooms (mushrooms)

Andrew the mushroom expert is investigating mushrooms native to Singapore.

As part of his research, Andrew collected n mushrooms labelled 0 to $n - 1$. Each mushroom is of one of two species, which are called A and B.

Andrew knows that **mushroom 0 belongs to species A**, but as the two species look the same, he does not know the species of mushrooms 1 to $n - 1$.

Fortunately, Andrew has a machine in his lab that can help with this. To use this machine, one should place two or more mushrooms in a row inside the machine (in any order) and turn the machine on. Then, the machine calculates the number of **adjacent** pairs of mushrooms that are of different species. For example, if you place mushrooms of species $[A, B, B, A]$ (in that order) into the machine, the result will be 2.

However, as operating the machine is very expensive, the machine can be used for a limited number of times. In addition, the total number of mushrooms placed in the machine across all its uses cannot exceed 100 000. Use this machine to help Andrew count the number of mushrooms of species A collected.

Implementation details

You should implement the following procedure:

```
int count_mushrooms(int n)
```

- n : number of mushrooms collected by Andrew.
- This procedure is called exactly once, and should return the number of mushrooms of species A.

The above procedure can make calls to the following procedure:

```
int use_machine(int[] x)
```

- x : an array of length between 2 and n inclusive, describing the labels of the mushrooms placed in the machine, in order.
- The elements of x must be **distinct** integers from 0 to $n - 1$ inclusive.
- Let d be the length of array x . Then, the procedure returns the number of different indices j , such that $0 \leq j \leq d - 2$ and mushrooms $x[j]$ and $x[j + 1]$ are of different species.

- This procedure can be called at most 20 000 times.
- The total length of x passed to the procedure `use_machine` among all its invocations cannot exceed 100 000.

Examples

Example 1

Consider a scenario in which there are 3 mushrooms of species $[A, B, B]$, in order. The procedure `count_mushrooms` is called in the following way:

```
count_mushrooms(3)
```

This procedure may call `use_machine([0, 1, 2])`, which (in this scenario) returns 1. It may then call `use_machine([2, 1])`, which returns 0.

At this point, there is sufficient information to conclude that there is only 1 mushroom of species A. So, the procedure `count_mushrooms` should return 1.

Example 2

Consider a case in which there are 4 mushrooms with species $[A, B, A, A]$, in order. The procedure `count_mushrooms` is called as below:

```
count_mushrooms(4)
```

This procedure may call `use_machine([0, 2, 1, 3])`, which returns 2. It may then call `use_machine([1, 2])`, which returns 1.

At this point, there is sufficient information to conclude that there are 3 mushrooms of species A. Therefore, the procedure `count_mushrooms` should return 3.

Constraints

- $2 \leq n \leq 20\,000$

Scoring

If in any of the test cases, the calls to the procedure `use_machine` do not conform to the rules mentioned above, or the return value of `count_mushrooms` is incorrect, the score of your solution will be 0. Otherwise, let Q be the maximum number of calls to the procedure `use_machine` among all test cases. Then, the score will be calculated according to the following table:

| Condition | Score |
|----------------------------|---------------------------|
| $20\,000 < Q$ | 0 |
| $10\,010 < Q \leq 20\,000$ | 10 |
| $904 < Q \leq 10\,010$ | 25 |
| $226 < Q \leq 904$ | $\frac{226}{Q} \cdot 100$ |
| $Q \leq 226$ | 100 |

In some test cases the behavior of the grader is adaptive. This means that in these test cases the grader does not have a fixed sequence of mushroom species. Instead, the answers given by the grader may depend on the prior calls to `use_machine`. Though, it is guaranteed that the grader answers in such a way that after each interaction there is at least one sequence of mushroom species consistent with all the answers given so far.

Sample grader

The sample grader reads an array s of integers giving the mushroom species. For all $0 \leq i \leq n - 1$, $s[i] = 0$ means the species of mushroom i is A, whereas $s[i] = 1$ means the species of mushroom i is B. The sample grader reads input in the following format:

- line 1: n
- line 2: $s[0] \ s[1] \ \dots \ s[n - 1]$

The output of sample grader is in the following format:

- line 1: the return value of `count_mushrooms`.
- line 2: the number of calls to `use_machine`.

Note that the sample grader is not adaptive.