

## ZCO 2015, Morning Session

### Problem 1 Break Up

A sequence of positive integers is a *palindrome* if it reads the same in both directions. The sequences 23, 45, 23 and 23, 45, 56, 23, 23, 56, 45, 23 are examples of palindromes. The sequence 23, 45, 56 is not a palindrome. The sequence 23, 32 is not a palindrome either. A sequence of length 1 is always a palindrome.

A given sequence of integers can be broken up into parts such that each of them is a palindrome. Consider the sequence 34, 45, 34, 56, 34. This can be broken up into 3 palindrome sequences with 34, 45, 34 constituting the first, 56 constituting the second and 34 constituting the third. It can also be broken in 5 palindrome sequences each containing a single number. Thus, there may be many different ways to break up a given sequence into palindrome sequences. We want to determine the smallest number  $C$  such that the given sequence can be broken up into  $C$  palindrome sequences.

Observe that for any palindrome sequence the value of  $C$  is 1. For the sequence 34, 45, 34, 56, 34 the answer is 3. Your aim is to write a program that computes this number for any given sequence.

### Input format

- The first line contains  $N$  the number of values in the sequence.
- This is followed by a line containing  $N$  positive integers separated by space giving the values of the sequence.

### Output format

Output a single integer giving the smallest number  $C$  so that the given sequence can be broken up into  $C$  palindrome sequences.

### Test data

You may assume that all integers in the input are in the range 1 to  $10^8$  inclusive.

**Subtask 1 (100 Marks)**  $1 \leq N \leq 300$ .

### Sample input

```
5
34 45 34 56 34
```

### Sample output

```
3
```

### Limits

- *Memory limit* : 256MB
- *Time limit* : 2s

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### Problem 2 Variation

We say that two integers  $x$  and  $y$  have a variation of at least  $K$ , if  $|x - y| \geq K$  (the absolute value of their difference is at least  $K$ ). Given a sequence of  $N$  integers  $a_1, a_2, \dots, a_N$  and  $K$ , the total variation count is the number of pairs of elements in the sequence with variation at least  $K$ , i.e. it is the size of the set of pairs

$$\{(i, j) \mid 1 \leq i < j \leq N \text{ and } |a_i - a_j| \geq K\}$$

For example if  $K = 1$  and the sequence is 3, 2, 4 the answer is 3. If  $K = 1$  and the sequence is 3, 1, 3 then the answer is 2.

Your task is to write a program that takes a sequence and the value  $K$  as input and computes the total variation count.

### Input format

- The first line contains two positive integers  $N$  and  $K$ , separated by a space.
- This is followed by a line containing  $N$  integers separated by space giving the values of the sequence.

### Output format

A single integer in a single line giving the total variation count.

### Test data

You may assume that all integers in the input are in the range 0 to  $10^8$  inclusive.

**Subtask 1 (40 Marks)**  $1 \leq N \leq 4000, 1 \leq K \leq 10^8$ .

**Subtask 2 (60 Marks)**  $1 \leq N \leq 65000, 1 \leq K \leq 10^8$ .

### Sample input

```
3 1
3 1 3
```

### Sample output

```
2
```

### Limits

- *Memory limit* : 256MB
- *Time limit* : 2s