



# Palindromic Subsets

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Problem

Submissions

Leaderboard

Discussions

Editorial

Consider a lowercase English alphabetic letter character denoted by  $c$ . A *shift* operation on some  $c$  turns it into the next letter in the alphabet. For example, and  $\text{shift}(\mathbf{a}) = \mathbf{b}$ ,  $\text{shift}(\mathbf{e}) = \mathbf{f}$ ,  $\text{shift}(\mathbf{z}) = \mathbf{a}$ .

Given a zero-indexed string,  $s$ , of  $n$  lowercase letters, perform  $q$  queries on  $s$  where each query takes one of the following two forms:

- 1  $i$   $j$   $t$ : All letters in the inclusive range from  $i$  to  $j$  are shifted  $t$  times.
- 2  $i$   $j$ : Consider all indices in the inclusive range from  $i$  to  $j$ . Find the number of non-empty subsets of characters,  $c_1, c_2, \dots, c_k$  where  $i \leq \text{index of } c_1 < \text{index of } c_2 < \dots < \text{index of } c_k \leq j$ , such that characters  $c_1, c_2, c_3, \dots, c_k$  can be rearranged to form a palindrome. Then print this number modulo  $10^9 + 7$  on a new line. Two palindromic subsets are considered to be different if their component characters came from different indices in the original string.

**Note** Two palindromic subsets are considered to be different if their component characters came from different indices in the original string.

## Input Format

The first line contains two space-separated integers describing the respective values of  $n$  and  $q$ .

The second line contains a string of  $n$  lowercase English alphabetic letters (i.e., a through z) denoting  $s$ .

Each of the  $q$  subsequent lines describes a query in one of the two formats defined above.

## Constraints

- $1 \leq n \leq 10^5$
- $1 \leq q \leq 10^5$
- $0 \leq i < j < n$  for each query.
- $0 \leq t \leq 10^9$  for each query of type 1.

## Subtasks

For 20% of the maximum score:

- $n \leq 500$
- $q \leq 500$

For another 30% of the maximum score:

- All queries will be of type 2.

## Output Format

For each query of type 2 (i.e., 2  $i$   $j$ ), print the number of non-empty subsets of characters satisfying the conditions given above, modulo  $10^9 + 7$ , on a new line.

## Sample Input 0

```

3 5
aba
2 0 2
2 0 0
2 1 2
1 0 1 1
2 0 2

```

### Sample Output 0

```

5
1
2
3

```

### Explanation 0

We perform the following  $q = 5$  queries:

1. 2 0 2:  $s = \text{aba}$  and we want to find the palindromic subsets of substring **aba**. There are five such subsets that form palindromic strings (**a**, **b**, **a**, **aa**, and **aba**), so we print the result of  $5 \bmod (10^9 + 7) = 5$  on a new line.
2. 2 0 0:  $s = \text{aba}$  and we want to find the palindromic subsets of substring **a**. Because this substring only has one letter, we only have one subset forming a palindromic string (**a**). We then print the result of  $1 \bmod (10^9 + 7) = 1$  on a new line.
3. 2 1 2:  $s = \text{aba}$  and we want to find the palindromic subsets of substring **ba**. There are two such subsets that form palindromic strings (**b** and **a**), so we print the result of  $2 \bmod (10^9 + 7) = 2$  on a new line.
4. 1 0 1 1:  $s = \text{aba}$  and we need to perform  $t = 1$  shift operations on each character from index  $i = 0$  to index  $j = 1$ . After performing these shifts,  $s = \text{bca}$ .
5. 2 0 2:  $s = \text{bca}$  and we want to find the palindromic subsets of substring **bca**. There are three valid subsets that form palindromic strings (**b**, **c**, and **a**), so we print the result of  $3 \bmod (10^9 + 7) = 3$  on a new line.

f t in

Submissions:49

Max Score:80

Difficulty: Hard

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Java 7

```

1 import java.io.*;
2 import java.util.*;
3 import java.text.*;
4 import java.math.*;
5 import java.util.regex.*;
6
7 public class Solution {
8
9     public static void main(String[] args) {
10         Scanner in = new Scanner(System.in);
11         int n = in.nextInt();
12         int q = in.nextInt();
13         String s = in.next();
14         for(int a0 = 0; a0 < q; a0++){
15             // your code goes here
16         }
17     }
18 }
19

```

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