Data Structures Assignment-4

C) Good Numbers

A number is good if it is divisible by 9. You are given a string of length N comprising of digits from 0 to 9. You are given two types of operations:

1) You are given an index X and a digit Y. Change the digit at X^{th} index to Y.

2) You are given two numbers l and r. Consider the substring(l,r) as S. You pick a substring X from S randomly. You need to find the probability that the number formed by the substring X is a good number.

For query of type 2, you need to print the answer modulo $10^9 + 7$. The answer could be represented as $\frac{a}{b}$. So, you need to output $a \cdot b^{-1}$ modulo 1e9+7.

Input

First line contains two integers N and Q, the length of string and number of queries respectively.

The next line contains a string of length N containing digits.

Each of the next Q lines can be of one of the following type:
$1xy$
$2lr$

Output

For each query of type 2, you need to output the probability in the format specified.

Constraints

$1 \leq N \leq 100000$, length of string
$1 \leq Q \leq 100000$, number of queries
All the characters of string are digits from [0-9]
$1 \leq l \leq r \leq N$
$1 \leq x \leq N$
$0 \leq y \leq 9$

Sample Input 1

```
4 4
2709
2 1 4
2 3 4
1 3 9
2 1 4
```

Sample Output 1

```
200000002
1
200000002
```

Sample Explanation 1

The count of good numbers for the queries are 6, 3, 6. Taking modular probability gives the above resultant values.

Limits

Time: 2 second

Memory: 256 MB