Problem E

Substring Sort

In this problem, all strings are one-based indexed. Let s_i be the ith character of a string s. Let $s_{l..r}$ be a substring of s with the characters $s_l s_{l+1} \cdots s_r$.

You are given three strings each of length N: A, B, and C. You are asked to simulate Q queries according to the given order.

For each query, you are given two integers l and r as parameters, and must performs the following procedures:

1. Copy substrings $A_{l..r}$, $B_{l..r}$, and $C_{l..r}$. Let x, y and z be the copied substrings.

2. Sort $[x, y, z]$ in lexicographical order. Let $[x', y', z']$ be the sorted results.

3. Replace substring $A_{l..r}$ with x', substring $B_{l..r}$ with y' and substring $C_{l..r}$ with z' respectively.

Determine the value of A, B, and C after all queries.

Input

Input begins with two integers N Q ($1 \leq N \leq 100\,000$; $1 \leq Q \leq 100\,000$) representing the length of the given strings and the number of queries. Each of the next 3 lines contains a string of length N. The first, second, and third lines contain A, B, and C respectively. The strings consist of lowercase characters. Each of the next Q lines contains two integers l r ($1 \leq l \leq r \leq N$) representing the parameters of each query.

Output

The output consists of 3 lines. In each line, output the final value of A, B and C after all queries in that order.

Sample Input #1

```
5 2
icpca
siaja
karta
2 4
1 5
```

Sample Output #1

```
iarta
kiaja
scpca
```

Explanation for the sample input/output #1

In the first query, the value of x, y, and z are `cpc`, `iaj`, `art` respectively. After sorting those strings, the value of x', y', and z' becomes `art`, `cpc`, `iaj`. At the end of first query, the value of A, B, and C are `iarta`, `scpca` and `kiaja`.

During the second query, the value of x, y, and z are `iarta`, `scpca`, `kiaja` respectively. After sorting those strings, the value of x', y', and z' becomes `iarta`, `scpca`, `kiaja`. At the end of second query, the value of A, B, and C are `iarta`, `kiaja` and `scpca`.

Therefore the final value of A, B, C are `iarta`, `kiaja` and `scpca` respectively.

Sample Input #2

```
6 6
aabbcc
bcacab
cbcaba
1 1
2 2
3 3
4 4
5 5
6 6
```

Sample Output #2

```
aaaaaa
bbbbbb
cccccc
```

Sample Input #3

```
3 1
aba
aab
aac
1 3
```

Sample Output #3

```
aab
aac
aba
```