E. Changing the String

time limit per test: 2 seconds
memory limit per test: 512 megabytes

Given a string s that consists only of the first three letters of the Latin alphabet, meaning each character of the string is either a, b, or c.

Also given are q operations that need to be performed on the string. In each operation, two letters x and y from the set of the first three letters of the Latin alphabet are provided, and for each operation, one of the following two actions must be taken:

- change any (one) occurrence of the letter x in the string s to the letter y (if at least one occurrence of the letter x exists);
- do nothing.

The goal is to perform all operations in the given order in such a way that the string s becomes lexicographically minimal.

Recall that a string a is lexicographically less than a string b if and only if one of the following conditions holds:

- a is a prefix of b, but $a \neq b$;
- at the first position where a and b differ, the string a has a letter that comes earlier in the alphabet than the corresponding letter in b.

Input

Each test consists of several test cases. The first line contains a single integer t ($1 \leq t \leq 10^3$) — the number of test cases. The description of the test cases follows.

In the first line of each test case, there are two integers n and q ($1 \leq n, q \leq 2 \cdot 10^5$) — the length of the string s and the number of operations.

In the second line of each test case, the string s is given — a string of exactly n characters, each of which is a, b, or c.

The next q lines of each test case contain the description of the operations. Each line contains two characters x and y, each of which is a, b, or c.

Additional constraints on the input:

- the sum of n across all test cases does not exceed $2 \cdot 10^5$;
- the sum of q across all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, output the lexicographically minimal string that can be obtained from s using the given operations.

Example

input

```
3
2 2
cb
c b
b a
10 10
bbbbbbbbbb
b a
b c
c b
b a
c a
b c
b c
b a
a b
```


→ Last submissions

Submission	Time	Verdict
322697946	Jun/03/2025 18:07	Accepted
322696017	Jun/03/2025 18:05	Wrong answer on test 2

```
c a
30 20
abcaababcbbcabcbbcabcbabbbbabc
b c
b c
c a
b c
b c
b a
b c
b c
b a
b a
b a
b a
c a
b c
c a
b c
c a
c a
b c
c b
```

output Copy

```
ab
aaaaabbbbb
aaaaaaaaaaaaaaabbbabcbabbbbabc
```

Note

In the first test case, both operations need to be applied to the first letter:

1. after the first operation, s = "bb"
2. after the second operation, s = "ab"

In the second test case, the string could change as follows:

1. "bbbbabbbbb" (changed the 5-th letter)
2. "cbbbabbbbb" (changed the 1-st letter)
3. "cbbbabbbbb" (did nothing)
4. "cbbaabbbbb" (changed the 4-th letter)
5. "abbaabbbbb" (changed the 1-st letter)
6. "abcaabbbbb" (changed the 3-rd letter)
7. "abcaabbbbb" (did nothing)
8. "aacaabbbbb" (changed the 2-nd letter)
9. "aacaabbbbb" (did nothing)
10. "aaaaabbbbb" (changed the 3-rd letter)