

H. Heliopolis

time limit per test: 15 seconds
memory limit per test: 256 megabytes

Long ago, the city of Heliopolis stood tall in what is now Cairo. It had big stone pillars that reached for the sky, showing people's interest in the stars and the sun. It was a place full of learning and big ideas. Heliopolis still leaves a mark on history, inviting us all to dig deeper and learn more about the past.

As you reflect on the legacy of Heliopolis, you are faced with a new challenge.

You are given a string S of length N consisting of only lowercase English letters and Q queries of three types to perform.

- **1 K C**: replace the letter at index k in S with the letter C (i.e make $S_K = C$).
- **2 L R**: swap S_L and S_R .
- **3**: output the number of inversions in S .

Recall that an inversion in S is a pair of indices $i < j$ such that $S_i > S_j$.

For each query of type 3, output the number of inversions in S .

Input

The first line contains one integer T ($1 \leq T \leq 10^4$) — the number of test cases.

The first line of each test case contains one integer N ($2 \leq N \leq 10^6$) — the length of the string S .

The second line of each test case contains the string S consisting of only lowercase English letters.

The third line of each test case contains one integer Q ($1 \leq Q \leq 10^4$) — the number of queries.

Each of the following Q lines contains an integer X ($1 \leq X \leq 3$) — the type of the query.

- If $X = 1$, it will be followed by an integer K ($1 \leq K \leq N$), and a lowercase English letter C .
- If $X = 2$, it will be followed by two integers L and R ($1 \leq L, R \leq N, L \neq R$)

It is guaranteed that the sum of $N + Q$ over all test cases does not exceed $2 \cdot 10^6$.

Output

For each query of type 3, output the number of inversions in S .

Example

input	Copy
1 13 ramadankareem 10 1 2 k 2 4 5 3 1 8 1 2 6 10 2 4 12 1 7 m 3 2 5 11 3	
output	Copy
38 45 48	

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Group website

Group Contests

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- JCPC 2024 (Mirror)
- EthCPC (Mirror)
- PCPC 2024
- LyCPC 2024
- AOCPC 2024
- AOCPC 2023
- QCPC 2024 (Mirror)
- TCPC 2024 (Mirror)
- AICPC 2023
- SCPC 2024 (Mirror)
- SCPC 2024 For Teens (Mirror)
- ECPC 2024 (Mirror)
- ECPC Qualifications 2024 Day 6 (Mirror)
- ECPC Qualifications 2024 Day 5 (Mirror)
- ECPC Qualifications 2024 Day 4 (Mirror)
- ECPC Qualifications 2024 Day 3 (Mirror)
- ECPC Qualifications 2024 Day 2 (Mirror)
- ECPC Qualifications 2024 Day 1 (Mirror)
- International Collegiate Programming Contest, Damascus University Collegiate Programming Contest(2018)
- International Collegiate Programming Contest, Al-Baath, Tishreen, Aleppo and Damascus Collegiate Programming Contest (2021)
- The 2023 ICPC Egyptian Collegiate Programming Contest (Qualifications Day 2)
- ACPC Girls 2024
- The 2023 ICPC Egyptian Collegiate Programming Contest (Qualifications Day 6)
- The 2023 ICPC Egyptian Collegiate Programming Contest (Qualifications Day 1)
- The 2023 ICPC Egyptian Collegiate Programming Contest (Qualifications Day 3)
- ACPC KickOff 2024