Problem I
Reporting Documents

Each citizen in ICPC Kingdom must have their N kingdom-issued documents, numbered from 1 to N, on their hands at any time. The guards often ask random citizens for their documents during their patrol.

As a citizen of ICPC Kingdom, Adrian also has these documents on his hands as well; however, some of them might be missing due to his negligence. The existence status of all of his documents are represented by a string B where B_i represents the existence of document i. If document i is on his hand, then $B_i = 1$. Otherwise, $B_i = 0$ if document i is missing.

For each of the next Q days, exactly one of the following scenarios will happen.

- 1 x. Adrian found his missing document x, so B_x is updated to 1 (it is guaranteed that $B_x = 0$ right before this scenario).
- 2 x. Adrian lost his document x, so B_x is updated to 0 (it is guaranteed that $B_x = 1$ right before this scenario).
- 3 x k. A guard asks Adrian for document $x + k \cdot i$, where $x \leq k$, for all i that satisfies $0 \leq i$ and $1 \leq x + k \cdot i \leq N$. For each document he couldn't provide when the guard asked for it, Adrian will be fined for 1 coin.

For each scenarios involving a guard (i.e. scenario 3), Adrian asks you to count how many coins he needs to pay for the fine.

Input

Input begins with an integer N ($1 \leq N \leq 200\,000$) representing the number of documents. The next line contains a string B of length N, where the i^{th} character of B is B_i ($B_i \in \{$ 0, 1$\}$), the initial existence status of document i.

The next line contains an integer Q ($1 \leq Q \leq 200\,000$) representing the number of days. Each of the next Q lines contains a scenario. Each scenario begins with an integer t ($t \in \{1, 2, 3\}$). If $t = 1$ or $t = 2$, then it is followed by an integer x ($1 \leq x \leq N$) representing scenario 1 or 2, respectively. It is guaranteed that integer x in scenarios 1 and 2 satisfy the scenario description. If $t = 3$, then it is followed by two integers x k ($1 \leq x \leq k \leq N$) representing scenario 3. There will be at least one scenario of type 3.

Output

For each scenario 3, output an integer in a single line representing how many coins Adrian needs to pay for the fine for that day.

Sample Input #1

```
10
1010001001
```

```
5
3 1 2
2 1
1 5
1 9
3 1 1
```

Sample Output #1

```
2
5
```

Explanation for the sample input/output #1

At first, Adrian only has documents 1, 3, 7, and 10 on his hand.

On day 1, a guard asks Adrian for documents $1 + 2 \cdot i$, i.e. documents 1, 3, 5, 7, and 9. Adrian doesn't have documents 5 and 9 on his hand, thus, he will be fined for 2 coins.

On day 2, 3, and 4, he lost document 1, found document 5, and found document 9, respectively.

On day 5, a guard asks Adrian for documents $1 + 1 \cdot i$, i.e. all documents from 1 to 10. Adrian doesn't have documents 1, 2, 4, 6, and 8 on his hand, thus, he will be fined for 5 coins.

Sample Input #2

```
25
00100000101001101000000101
10
3 2 4
1 5
1 21
2 11
2 5
3 1 5
1 5
3 5 5
3 3 8
3 1 25
```

Sample Output #2

```
5
4
2
2
1
```