## 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 $N(1 \leq N \leq 200000)$ representing the number of documents. The next line contains a string $B$ of length $N$, where the $i^{\text {th }}$ character of $B$ is $B_{i}\left(B_{i} \in\{0,1\}\right)$, the initial existence status of document $i$.

The next line contains an integer $Q(1 \leq Q \leq 200000)$ 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
```

```
|
3 12
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
0010000010100110100000101
10
3 24
1 5
1 21
2 11
2 5
3 5
15
3 5 5
3 3 8
3 125
```


## Sample Output \#2

| 5 |  |
| :--- | :--- |
| 4 |  |
| 2 |  |
| 2 |  |
| 1 |  |

