Simple Text Editor

In this challenge, you must implement a simple text editor. Initially, your editor contains an empty string, S. You must perform Q operations of the following 4 types:

1. *append*(W) - Append string W to the end of S.
2. *delete*(k) - Delete the last k characters of S.
3. *print*(k) - Print the k^{th} character of S.
4. *undo*$()$ - Undo the last (not previously undone) operation of type 1 or 2, reverting S to the state it was in prior to that operation.

Input Format

The first line contains an integer, Q, denoting the number of operations.
Each line i of the Q subsequent lines (where $0 \leq i < Q$) defines an operation to be performed. Each operation starts with a single integer, t (where $t \in \{1, 2, 3, 4\}$), denoting a type of operation as defined in the *Problem Statement* above. If the operation requires an argument, t is followed by its space-separated argument. For example, if $t = 1$ and $W = \text{"abcd"}$, line i will be `1 abcd`.

Constraints

- $1 \leq Q \leq 10^5$
- $1 \leq k \leq |S|$
- The sum of the lengths of all W in the input $\leq 10^6$.
- All input characters are lowercase English letters.
- It is guaranteed that the sequence of operations given as input is possible to perform.

Output Format

Each operation of type 3 must print the k^{th} character on a new line.

Sample Input

```
8
1 abc
3 3
2 3
1 xy
3 2
4
4
3 1
```

Sample Output

```
c
y
a
```

Explanation

Initially, S is empty. The following sequence of 8 operations are described below:

1. $S = ""$. We append abc to S, so $S = "abc"$.
2. Print the 3^{rd} character on a new line. Currently, the 3^{rd} character is `c`.
3. Delete the last 3 characters in S (abc), so $S = ""$.
4. Append xy to S, so $S = "xy"$.
5. Print the 2^{nd} character on a new line. Currently, the 2^{nd} character is `y`.
6. Undo the last update to S, making S empty again (i.e., $S = ""$).
7. Undo the next to last update to S (the deletion of the last 3 characters), making $S = "abc"$.
8. Print the 1^{st} character on a new line. Currently, the 1^{st} character is `a`.