G - Binary Cat

Editorial (/contests/abc417/tasks/abc417_g/editorial)

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Time Limit: 6 sec / Memory Limit: 1024 MiB

Score : 625 points

Problem Statement

Define strings S_0 and S_1 as $S_0 =$ `0` and $S_1 =$ `1`.

You are given Q queries, so process them in order.
In the i-th query $(1 \leq i \leq Q)$, you are given a triple of integers (L_i, R_i, X_i).

> Let S_{i+1} be the string obtained by concatenating S_{L_i} and S_{R_i} in this order. Then, find the X_i-th character of S_{i+1}.
>
> It is guaranteed that X_i is at most the length of S_{i+1}.

Constraints

- $1 \leq Q \leq 5 \times 10^5$
- $0 \leq L_i, R_i \leq i$
- $1 \leq X_i \leq 10^{18}$
- X_i is at most the length of S_{i+1}.
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{aligned}
&Q \\
&L_1 \quad R_1 \quad X_1 \\
&L_2 \quad R_2 \quad X_2 \\
&\vdots \\
&L_Q \quad R_Q \quad X_Q
\end{aligned}
$$

Output

Output Q lines. The i-th line $(1 \leq i \leq Q)$ should contain the answer to the i-th query.

Sample Input 1 Copy

Copy

```
7
0 1 1
0 0 2
1 1 1
2 3 2
2 4 3
5 4 2
6 7 6
```

Sample Output 1 Copy

Copy

```
0
0
1
1
1
1
1
```

Each query is processed as follows:

- In the first query, concatenate $S_0 =$ `0` and $S_1 =$ `1` to get $S_2 =$ `01`. The first character of S_2 is `0`, so output 0 on the first line.
- In the second query, concatenate $S_0 =$ `0` and $S_0 =$ `0` to get $S_3 =$ `00`. The second character of S_3 is `0`, so output 0 on the second line.
- In the third query, concatenate $S_1 =$ `1` and $S_1 =$ `1` to get $S_4 =$ `11`. The first character of S_4 is `1`, so output 1 on the third line.

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- In the fourth query, concatenate S_2 =`01` and S_3 =`00` to get S_5 =`0100`. The second character of S_5 is `1`, so output 1 on the fourth line.
- In the fifth query, concatenate S_2 =`01` and S_4 =`11` to get S_6 =`0111`. The third character of S_6 is `1`, so output 1 on the fifth line.
- In the sixth query, concatenate S_5 =`0100` and S_4 =`11` to get S_7 =`010011`. The second character of S_7 is `1`, so output 1 on the sixth line.
- In the seventh query, concatenate S_6 =`0111` and S_7 =`010011` to get S_8 =`0111010011`. The sixth character of S_8 is `1`, so output 1 on the seventh line.

'#telegram)

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