

Contest Duration: 2025-10-25(Sat) 23:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20251025T2100&p1=248>) - 2025-10-26(Sun) 00:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20251025T2240&p1=248>) (local time) (100 minutes)

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F - Shortest Path Query

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Time Limit: 4 sec / Memory Limit: 1024 MiB

Score : 525 points

Problem Statement

You are given a grid with three rows and N columns. Denote the cell at the i -th row from the top and j -th column from the left as cell (i, j) . Cell (i, j) is a wall cell if $S_{i,j}$ is #, and an empty cell and passable if it is ..

You are given Q queries, which you should process in order.

Each query gives integers r and c , and you should flip the state of cell (r, c) . That is, if cell (r, c) is a wall cell, make it an empty cell, and if it is an empty cell, make it a wall cell. Then, output the answer to the following problem:

Consider moving from cell $(1, 1)$ to cell $(3, N)$ by repeatedly moving to an empty cell adjacent up, down, left, or right. Determine whether cell $(3, N)$ is reachable, and if reachable, find the minimum number of moves.

Constraints

- $2 \leq N \leq 2 \times 10^5$
- $S_{i,j}$ is # or ..
- $S_{1,1} = S_{3,N} = .$
- $1 \leq Q \leq 2 \times 10^5$

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- $1 \leq r \leq 3$
- $1 \leq c \leq N$
- $(r, c) \neq (1, 1), (3, N)$
- N, Q, r, c are integers.

Input

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

```

N
S1,1S1,2...S1,N
S2,1S2,2...S2,N
S3,1S3,2...S3,N
Q
query1
query2
⋮
queryQ

```

Each query is given in the following format:

```

r c

```

Output

Print Q lines.

On the i -th line ($1 \leq i \leq Q$), if cell $(3, N)$ is unreachable from cell $(1, 1)$ in the i -th query, print -1; if reachable, print the minimum number of moves.

Sample Input 1

Copy

```

5
.#...
.#.#.
...#.
3
1 2
1 2
2 3

```

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Sample Output 1

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```
6
10
-1
```

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In the first query, flip the state of cell $(1, 2)$. As a result, the state of each cell becomes:

```
.....
.#.#.
...#.
```

At this time, by moving from cell $(1, 1)$ through cells $(1, 2)$, $(1, 3)$, $(1, 4)$, $(1, 5)$, $(2, 5)$, $(3, 5)$ in order, you can reach cell $(3, 5)$ in six moves.

In the second query, flip the state of cell $(1, 2)$. As a result, the state of each cell becomes:

```
.#...
.#.#.
...#.
```

At this time, by moving from cell $(1, 1)$ through cells $(2, 1)$, $(3, 1)$, $(3, 2)$, $(3, 3)$, $(2, 3)$, $(1, 3)$, $(1, 4)$, $(1, 5)$, $(2, 5)$, $(3, 5)$ in order, you can reach cell $(3, 5)$ in ten moves.

In the third query, flip the state of cell $(2, 3)$. As a result, the state of each cell becomes:

```
.#...
.###.
...#.
```

At this time, no matter how you move, you cannot reach cell $(3, 5)$ from cell $(1, 1)$.

Sample Input 2

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```
7
.#.....
.#..#..
...#...
6
2 5
3 4
3 5
2 5
1 4
1 4
```

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Sample Output 2

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```
10
8
10
12
-1
12
```

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