

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
```

Copy

Sample Output 1

Copy

```
6  
10  
-1
```

Copy

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

Copy

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

Copy

Sample Output 2

Copy

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

Copy

```
/#telegram)
```

```
#url=https%3A%2F%2Fatcoder.jp%2Fcontests%2Fabc429%2Ftasks%2Fabc429_f%3Flang%3Den&title=F%20-
```

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