Tourism

2022/2023 SEASON – FOURTH ROUND

California, Rome, Dubai, Paris, Amsterdam, London, Rousse, Emiliyan is travelling again.

He is in cell *S* of a given map and wants to reach cell *F*. The remaining cells of the map are . and #. Cells *S*, *F* and . symbolize land and the # cells symbolize water. Unfortunately, he cannot swim and can only move on land. For a unit of time, he can move to cells that are directly up, down, left, or right from his current one.

There are also q two-way airline routes. Each is characterized by 5 parameters $(x1, y1, x2, y2, t)$, which means he can move from cell $(x1, y1)$ to cell $(x2, y2)$ or from cell $(x2, y2)$ to cell $(x1, y1)$ for t units of time. Cells $(x1, y1)$ and $(x2, y2)$ are part of the land.

Find the minimum amount of time it takes to get from *S* to *F*.

Input

The first line of the file **tourism.in** contains the numbers n and m. Each of the next n lines contains m symbols that describe the map. It is guaranteed that there is exactly 1 *S* cell and exactly 1 *F* cell.

The next line contains the number q, the number of airline lines, and the next q lines contain 5 numbers each, $(x1, y1, x2, y2, t)$, characterizing the corresponding airline route.

Output

On the only line of the file **tourism.out**, print the minimum time it takes to get from S to F. If there is no possible path, print -1.

Constraints

$1 \leq n, m \leq 200$

$1 \leq q \leq 20\,000$

$1 \leq t \leq 1000$

$1 \leq x1, x2 \leq n$

$1 \leq y1, y2 \leq m$

Time limit: 0.4 sec.
Memory limit: 256 MB.
Sample test

Input (tourism.in)	Output (tourism.out)
5 3 S#. ... ###	104

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... ..F 1 5 3 1 3 100	