## Problem F Hopscotch

## Time Limit: ? Second(s)

There's a new art installation in town, and it inspires you... to play a childish game. The art installation consists of a floor with an $n \times n$ matrix of square tiles. Each tile holds a single number from 1 to $k$. You want to play hopscotch on it. You want to start on some tile numbered 1, then hop to some tile numbered 2 , then 3 , and so on, until you reach some tile numbered $k$. You are a good hopper, so you can hop any required distance. You visit exactly one tile of each number from 1 to $k$.

What's the shortest possible total distance over a complete game of Hopscotch? Use the Manhattan distance: the distance between the tile at $\left(x_{1}, y_{1}\right)$ and the tile at $\left(x_{2}, y_{2}\right)$ is $\left|x_{1}-x_{2}\right|+\left|y_{1}-y_{2}\right|$.

## Input

The first line of input contains two space-separated integers $n(1 \leq n \leq 50)$ and $k\left(1 \leq k \leq n^{2}\right)$, where the art installation consists of an $n \times n$ matrix with tiles having numbers from 1 to $k$.

Each of the next $n$ lines contains $n$ space-separated integers $x(1 \leq x \leq k)$. This is the art installation.

## Output

Output a single integer, which is the total length of the shortest path starting from some 1 tile and ending at some $k$ tile, or -1 if it isn't possible.

| Sample Input 1 | Sample Output 1 |
| :---: | :---: |
| 105 | 5 |
| $\begin{array}{llllllllll}5 & 1 & 3 & 4 & 2 & 4 & 2 & 1 & 2 & 1\end{array}$ |  |
| $\begin{array}{lllllllllll}4 & 5 & 3 & 4 & 1 & 5 & 3 & 1 & 1 & 4\end{array}$ |  |
| $\begin{array}{llllllllll}4 & 2 & 4 & 1 & 5 & 4 & 5 & 2 & 4 & 1\end{array}$ |  |
| $\begin{array}{llllllllll}5 & 2 & 1 & 5 & 5 & 3 & 5 & 2 & 3 & 2\end{array}$ |  |
| $\begin{array}{llllllllll}5 & 5 & 2 & 3 & 2 & 3 & 1 & 5 & 5 & 5\end{array}$ |  |
| $\begin{array}{llllllllll}3 & 4 & 2 & 4 & 2 & 2 & 4 & 4 & 2 & 3\end{array}$ |  |
| $\begin{array}{llllllllll}1 & 5 & 1 & 1 & 2 & 5 & 4 & 1 & 5 & 3\end{array}$ |  |
| $\begin{array}{llllllllll}2 & 2 & 4 & 1 & 2 & 5 & 1 & 4 & 3 & 5\end{array}$ |  |
| $\begin{array}{llllllllll}5 & 3 & 2 & 1 & 4 & 3 & 5 & 2 & 3 & 1\end{array}$ |  |
| $\begin{array}{llllllllll}3 & 4 & 2 & 5 & 2 & 5 & 3 & 4 & 4 & 2\end{array}$ |  |

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## Sample Input 2 <br> Sample Output 2

| 10 | 5 |  |  |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 5 | 1 | 5 | 4 | 1 | 2 | 2 | 4 | 5 | 2 |
| 4 | 2 | 1 | 4 | 1 | 1 | 1 | 5 | 2 | 5 |
| 2 | 2 | 4 | 4 | 4 | 2 | 4 | 5 | 5 | 4 |
| 2 | 4 | 4 | 5 | 5 | 5 | 2 | 5 | 5 | 2 |
| 2 | 2 | 4 | 4 | 4 | 5 | 4 | 2 | 4 | 4 |
| 5 | 2 | 5 | 5 | 4 | 1 | 2 | 4 | 4 | 4 |
| 4 | 2 | 1 | 2 | 4 | 4 | 1 | 2 | 4 | 5 |
| 1 | 2 | 1 | 1 | 2 | 4 | 4 | 1 | 4 | 5 |
| 2 | 1 | 2 | 5 | 5 | 4 | 5 | 2 | 1 | 1 |
| 1 | 1 | 2 | 4 | 5 | 5 | 5 | 5 | 5 | 5 |

-1
$\begin{array}{llllllllll}5 & 1 & 5 & 4 & 1 & 2 & 2 & 4 & 5 & 2\end{array}$
$\begin{array}{llllllllll}4 & 2 & 1 & 4 & 1 & 1 & 1 & 5 & 2 & 5\end{array}$
$\begin{array}{llllllllll}2 & 2 & 4 & 4 & 4 & 2 & 4 & 5 & 5 & 4\end{array}$
$\begin{array}{llllllllll}2 & 4 & 4 & 5 & 5 & 5 & 2 & 5 & 5 & 2\end{array}$
$\begin{array}{llllllllll}2 & 2 & 4 & 4 & 4 & 5 & 4 & 2 & 4 & 4\end{array}$
$\begin{array}{llllllllll}5 & 2 & 5 & 5 & 4 & 1 & 2 & 4 & 4 & 4\end{array}$
$\begin{array}{llllllllll}4 & 2 & 1 & 2 & 4 & 4 & 1 & 2 & 4 & 5\end{array}$
$\begin{array}{llllllllll}1 & 2 & 1 & 1 & 2 & 4 & 4 & 1 & 4 & 5\end{array}$
$\begin{array}{llllllllll}1 & 1 & 2 & 4 & 5 & 5 & 5 & 5 & 5 & 5\end{array}$

