# 4831   Survivor

You are designing an immunity challenge for the next season of Survivor™. The challenge is to find the shortest route across a pit-maze. Pillars have been placed in the pit, spaced on a regular grid (see Figure 1 for a top-down view). Planks have been placed across the gaps between some of the pillars.

The planks can only be placed in the horizontal or vertical direction, since they are too short to bridge the diagonal gaps. Two survivors will face this challenge, but one of them (referred to as "the first survivor" onwards) has been preselected to make an important decision: the first survivor must choose to either use a spare plank on his own run, or to penalize the opponent with 3 points.

After making this choice, both survivors must calculate the shortest path from the entry point (always pillar no. $N$ , where $N$ is the total number of pillars) to the exit point (always pillar no. 1), where the length of a path is taken to be the number of planks traversed from the entry point to the exit point. If the first survivor chose to use the spare plank, then he will be able to



Figure 1: The maze, as seen from above

place this plank across any single horizontal or vertical gap between the pillars in an attempt to create a shorter path — the plank can only be used once. The other survivor will have to traverse the maze *without* the help of this additional plank.

Alternatively, if the first survivor chose to *not* use the plank, then both survivors will calculate the shortest path through the exact same maze, but the opponent will have three (3) points added to his shortest path length. It is assumed that both survivors will always compute the correct shortest path for any given maze.

Your program must compute the shortest path length, from the perspective of the first survivor, for a given maze using the option (use plank, or penalty for opponent) that gives the first survivor the advantage.

## Input

Your input consists of an arbitrary number of records, each record conforming to the following format:

$n$
$k$
$s_1$    $e1$
$s_2$    $e2$
...    ...
$s_k$    $e_k$

The grid of pillars is always a square grid of $n \times n$ pillars, such that $N = n \times n$. The value $k$ denotes the number of planks that have already been placed in the maze. The next $k$ lines contain the starting pillar index ($s_i$) and ending pillar index ($e_i$) for each plank. Pillars are numbered by row, starting from 1, as indicated in Figure 1. The pair of numbers '2 3' therefore indicates the presence of a plank between pillars 2 and 3.

The number $n$ is in the range $4 \ldots 7$, and $k$ is in the range $6 \ldots 84$. The end of input is indicated by a line containing only the value '-1', equivalent to $n == -1$.
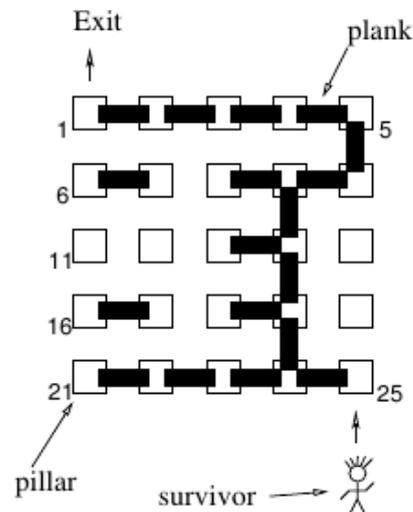
## Output

For each input record, print out the line

*c*

where *c* denotes the length of the shortest path *from the perspective of the first survivor*, taking both the spare plank, as well as the penalty options into account.

## Sample Input

```
4
8
1 2
2 3
3 7
7 8
8 12
12 11
11 15
15 16
4
10
1 2
2 3
3 4
4 8
8 12
12 11
11 10
10 14
14 15
15 16
-1
```

## Sample Output

```
8
6
```