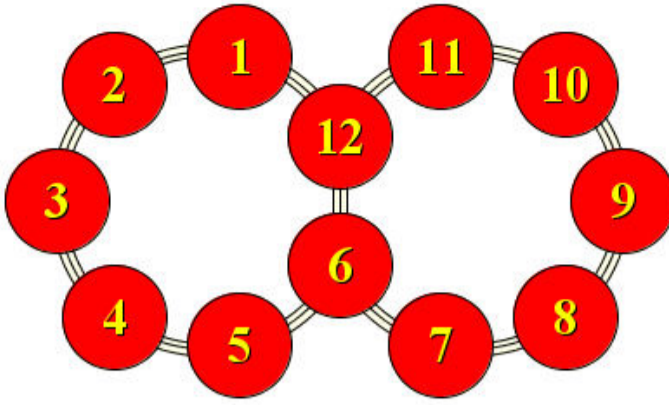Happy 12 is a puzzle consisting of 12 tokens placed on two intersecting rings. The initial configuration is [1,2,3,4,5,6,7,8,9,10,11,12] and is shown below:



We have 6 moves available:

- turning left ring clockwise
- turning left ring counter-clockwise
- turning right ring clockwise
- turning right ring counter-clockwise
- turning whole puzzle clockwise
- turning whole puzzle counter-clockwise

The configuration after the clockwise turn on the left ring is [2,3,4,5,6,12,7,8,9,10,11,1] and is shown below:
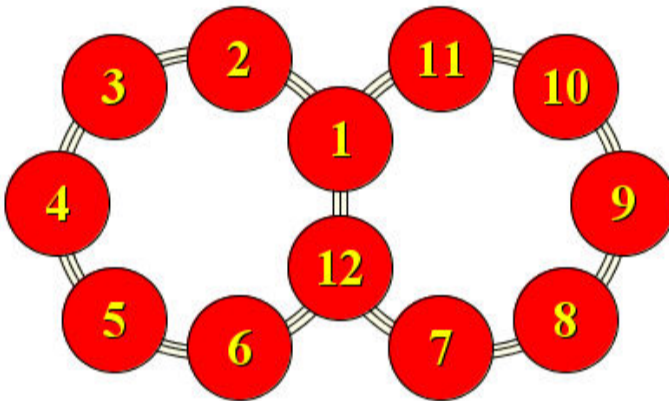


The configuration after the counter-clockwise turn on the whole puzzle is [12,1,2,3,4,5,6,7,8,9,10,11] and is also shown below:
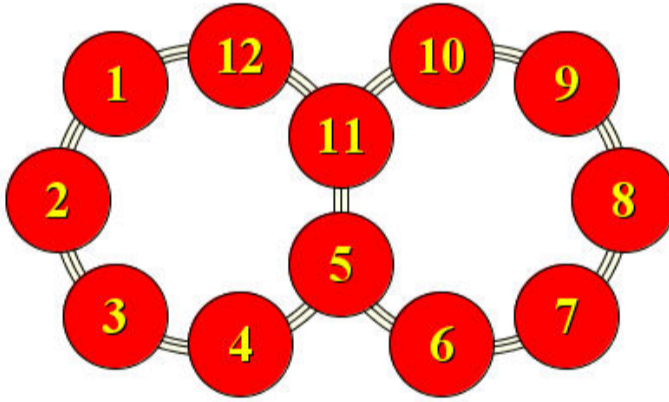


Given a configuration of the puzzle, what is the minimum number of moves needed to get the puzzle into the initial configuration?

**Note:** *Every possible configuration can be obtained from the initial configuration using the available moves listed above.* **For any configuration of the puzzle, the minimum number of moves to reach it from the initial configuration is less than 20.**

## Input

The input starts with an integer $T$ — the number of test cases $(T \leq 100)$. $T$ cases follow on each subsequent line, each of them containing a permutation of integers from 1 to 12 — current configuration of the puzzle.

## Output

For each test case, print on a separate line the minimum number or moves needed to get the puzzle into the initial configuration.

## Sample Input

```
2
1 2 3 4 5 6 7 8 9 10 11 12
2 3 4 5 11 12 6 7 8 9 10 1
```

## Sample Output

```
0
3
```