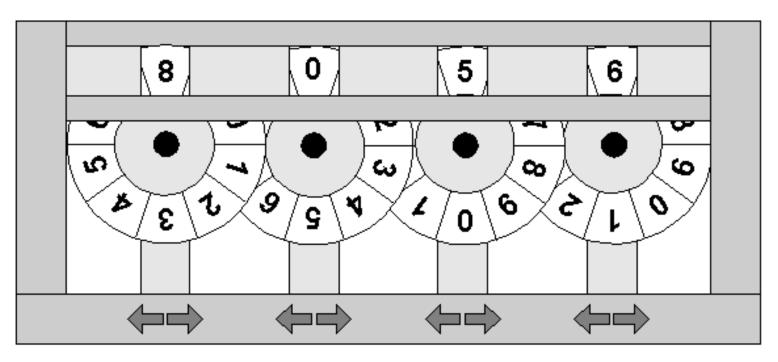
#### **Problem C**

# **Playing with Wheels**

**Input:** standard Input

**Output:** standard output

In this problem we will be considering a game played with four wheels. Digits ranging from 0 to 9 are printed consecutively (clockwise) on the periphery of each wheel. The topmost digits of the wheels form a four-digit integer. For example, in the following figure the wheels form the integer 8056. Each wheel has two buttons associated with it. Pressing the button marked with a *left arrow* rotates the wheel one digit in the clockwise direction and pressing the one marked with the *right arrow* rotates it by one digit in the opposite direction.



The game starts with an initial configuration of the wheels. Say, in the initial configuration the topmost digits form the integer  $S_1S_2S_3S_4$ . You will be given some (say, n) forbidden configurations  $F_{i1}F_{i2}F_{i3}F_{i4}$  (1 <= i <= n) and a target configuration  $T_1T_2T_3T_4$ . Your job will be to write a program that can calculate the minimum number of button presses required to transform the initial configuration to the target configuration by never passing through a forbidden one.

#### Input

The first line of the input contains an integer N giving the number of test cases to follow.

The first line of each test case contains the initial configuration of the wheels specified by 4 digits. Two consecutive digits are separated by a space. The next line contains the target configuration. The third line contains an integer n giving the number of forbidden configurations. Each of the following n lines contains a forbidden configuration.

There is a blank line between two consecutive input sets.

## **Output**

For each test case in the input print a line containing the minimum number of button presses required. If the target configuration is not reachable then print -1.

## Sample Input

```
2
  0 5 6
 5 0 8
5
   5
      7
 0
  0 4 7
 5 0 8
    0 8
    0
  0 0 0
  3 1 7
8
    0 1
  0
       9
    0
    1
       0
    9
  1 0
       0
    0
    0 0
```

## **Sample Output**

14 -1

Rezaul Alam Chowdhury