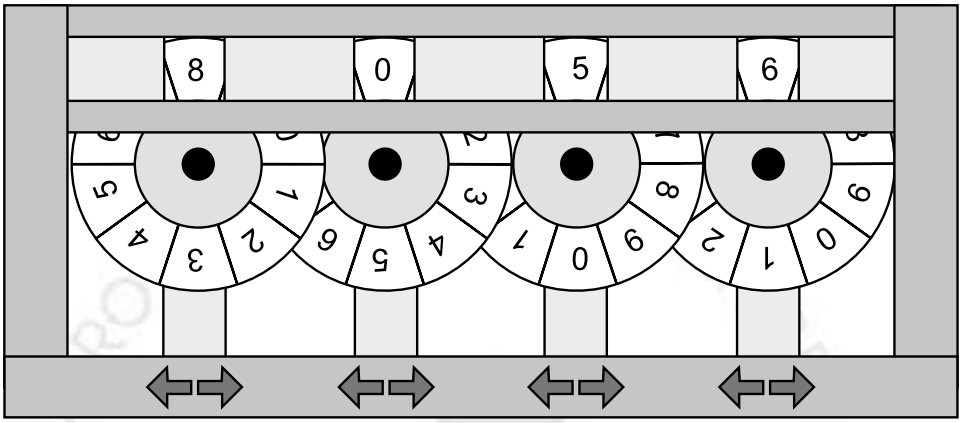
110902 Playing With Wheels

Consider the following mathematical machine. 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 8,056. 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.



We start with an initial configuration of the wheels, with the topmost digits forming the integer $S_1S_2S_3S_4$. You will be given a set of n forbidden configurations $F_{i_1}F_{i_2}F_{i_3}F_{i_4}$ $(1 \leq i \leq n)$ and a target configuration $T_1T_2T_3T_4$. Your job is to write a program to calculate the minimum number of button presses required to transform the initial configuration to the target configuration without passing through a forbidden one.

Input

The first line of the input contains an integer N giving the number of test cases. A blank line then follows.

The first line of each test case contains the initial configuration of the wheels, specified by four 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 print "`-1`".

Sample Input

```
2

8 0 5 6
6 5 0 8
5
8 0 5 7
8 0 4 7
5 5 0 8
```



```
7 5 0 8
6 4 0 8

0 0 0 0
5 3 1 7
8
0 0 0 1
0 0 0 9
0 0 1 0
0 0 9 0
0 1 0 0
0 9 0 0
1 0 0 0
9 0 0 0
```

Sample Output

```
14
-1
```