

Problem Solving Techniques 문제해결

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Exercise E

■ 5 points

- The exercise is not evaluated in detail but evaluated as Pass/Fail.
- (Note that each homework will be about 100 points.)

■ Why 5 points?

- I want all students to solve this exercise to participate in-class discussion for the exercise.

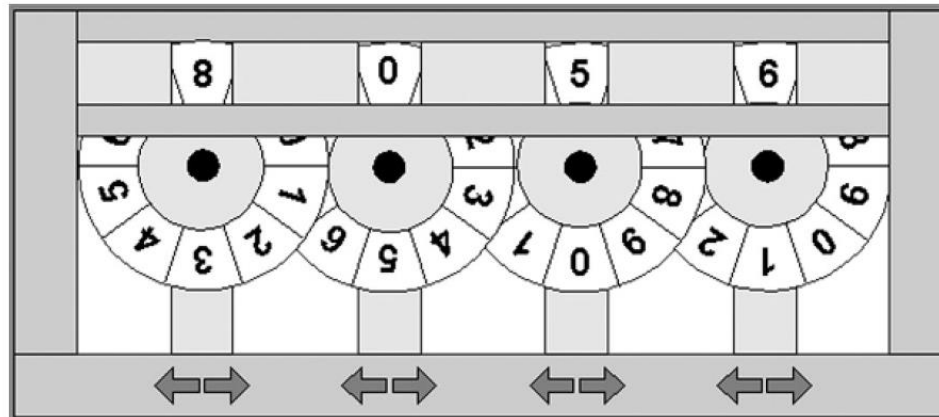
■ Report submission (no code submission)

- Due date: 5/10 23:59 (no late submission accepted)
- Submission site: <https://icampus.skku.edu/>
- Submission format: [Template] Report for exercise/homework
 - File name: yourid_EX_E.pdf
 - Example: 2000123456_EX_E.pdf

Exercise E

■ Playing with wheels

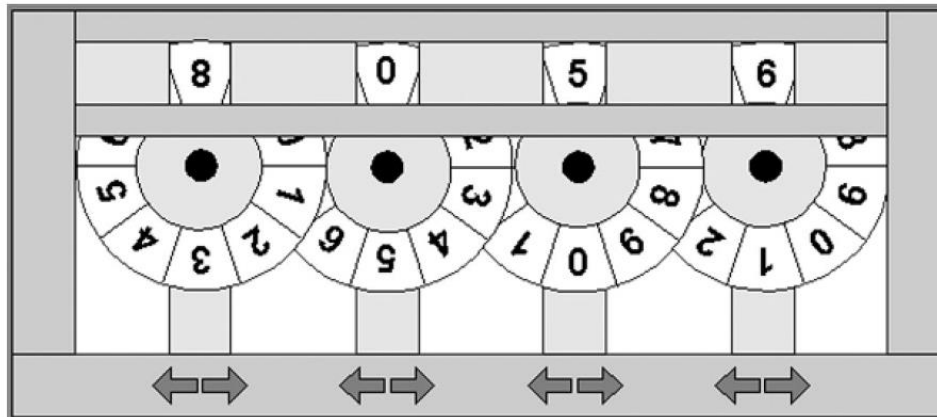
- Consider the following mathematical machine. Digits ranging from 0 to 9 are printed consecutively (clockwise) on the periphery of each wheel. The topmost digits of the wheels form a four-digit integer. For example, in the following figure the wheels form the integer 8,056. Each wheel has two buttons 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.



Exercise E

■ Playing with wheels

- 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 $F_{i1}F_{i2}F_{i3}F_{i4}$ ($1 \leq i \leq n$) 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.



Exercise E

■ 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”.

Exercise E

■ Sample input and output

Sample input

1

8 0 5 6

Initial number

6 5 0 8

Final number

5

8 0 5 7

8 0 4 7

5 5 0 8

7 5 0 8

6 4 0 8

Forbidden
numbers

Sample output

14

the minimum
number of button
presses required

Exercise E

■ Sample input and output

Sample input

1

8 0 5 6

Initial number

6 5 0 8

Final number

5

8 0 5 7

8 0 4 7

5 5 0 8

7 5 0 8

6 4 0 8

Forbidden
numbers

Sample output

14

the minimum
number of button
presses required

X

O

8056	8056
8057	8046
8058	8036
8048	8037
8038	8038
8028	8028
8018	8018
8008	8008
7008	7008
6008	6008
6108	6908
6208	6808
6308	6708
6408	6608
6508	6508