



## Problem 3. «Latin square»

Alice has registered on Bob's server. During the registration Alice got the secret key that is represented as a latin square of order 10. A latin square is a  $10 \times 10$  matrix filled with integers  $0, 1, \dots, 9$ , each occurring exactly once in each row and exactly once in each column.

To get an access to Bob's resources Alice authenticates by the following algorithm:

1. Bob sends to Alice a decimal number  $abcd$ , where  $a, b, c, d \in \{0, 1, \dots, 9\}$  and  $a \neq b, b \neq c, c \neq d$ .
2. Alice performs three actions.
  - At first she finds the integer  $t_1$  standing at the intersection of the row  $(a + 1)$  and the column  $(b + 1)$ .
  - Then she finds  $t_2$  standing at the intersection of the row  $(t_1 + 1)$  and the column  $(c + 1)$ .
  - Finally, Alice finds  $t_3$  standing at the intersection of the row  $(t_2 + 1)$  and the column  $(d + 1)$ .
3. Alice sends to Bob the integer  $t_3$ .
4. Bob performs the same actions and verifies Alice's answer.
5. Steps 1-4 are repeated several times. In case of success Bob recognizes that Alice knows the secret latin square.

Find Alice's secret key if you can get the answer  $t_3$  for any your correct input request  $abcd$  [here](#).