

7-th Bulgarian National Olympiad in Informatics

February, 1991

Final round

A standard chess-board has 8 columns denoted by letters from A through H and 8 rows denoted by digits from 1 through 8. The following problems concern the chess king.

Problem 1.

Program the following commands for moving the king:

FORWARD n -- to move repeatedly the king through n squares forward.

TORIGHT n -- to move repeatedly the king through n squares to the right hand direction.

BACKWARD n -- to move repeatedly the king through n squares backward.

TOLEFT n -- to move repeatedly the king through n squares to the left hand direction.

REACH <position> -- to place the king on <position> according to the rules of the chess game, i.e. at the next square in any direction. The <position> is specified as usual by a combination of one letter and one digit, e.g. A5, C7, etc..

Problem 2.

Given an initial position of the king and a program for moving in the following form

```
BEGIN
  COMMAND_1;
  COMMAND_2;
  . . . . .
  COMMAND_N;
END
```

where the commands are described in the previous problem, you should output the sequence of moves, that the king will make.

An example:

Given initial position A1 and the following program

```
BEGIN
  FORWARD 2;
  TORIGHT 3;
  REACH E4;
END
```

the sequence of moves can be look like the following one:

A1 A2 A3 B3 C3 D3 E3 E4.

Problem 3.

Let us divide commands FORWARD, TORIGHT, BACKWARD and TOLEFT into two groups. The first one consists of FORWARD and BACKWARD, whereas the second one consists of TORIGHT and TOLEFT. Let us consider a program, that contains only commands FORWARD, TORIGHT, BACKWARD and TOLEFT. An allowed substitution is to replace two adjacent commands belonging to different groups by one REACH command. After making such a substitution, the total number of commands will decrease by 1.

Write a program, that transforms a given program by making substitutions of the above type, so that the king will do the minimal number of moves.

Source: Obuchenieto po matematika i informatika, journal published by Bulgarian Ministry of Education, n. 2, 1991, pp. 39-40.

© The text is translated from Bulgarian by [Emil Kelevedzhiev \(keleved@math.bas.bg\)](mailto:keleved@math.bas.bg)

[Return](#) to the Home Page of Bulgarian Mathematics and Informatics Competitions.

/P>

Retrieved from <http://www.math.bas.bg/bcmi/noi91.html>.