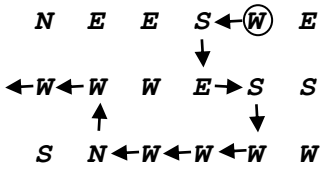
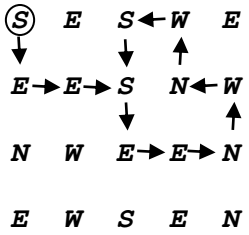
# Problem 2: Robot Motion

Source filename: `robot.cpp`
Input filename: `robot.in`
Output filename: `robot.out`




Grid 1




Grid 2

A robot has been programmed to follow the instructions it finds in its path. Instructions for the next direction the robot is to move are laid down in a grid. The possible instructions are:

N – move North
S – move South
E – move East
W – move West

For example, suppose the robot starts on the north side of Grid 1 at the position indicated by the circle. The path the robot follows is shown. The robot goes through 10 instructions in the grid before leaving the grid.

Compare what happens in Grid 2. The robot in grid 2 again starts at the position indicated by the circle. It then goes through 3 instructions only once, and then starts a loop through 8 instructions, and never exits.

You are to write a program that determines how long it takes a robot to get out of the grid or how the robot loops around.

There will be one or more grids for robots to navigate. The input file for each grid is in the following format. On the 1st line are four integers separated by one or more blanks: $n$ ($1 \le n \le 100$) = number of rows in the grid; $m$ ($1 \le m \le 100$) = number of columns in the grid; $x$ ($1 \le x \le n$) = row number of robot's start position; and $y$ ($1 \le y \le m$) = column number of robot's start position.

The next $n$ lines will contain $n$ rows of the grid. Each of these lines will contain $m$ instructions (`N`, `S`, `E`, or `W`). There will be no spaces in these lines.

The next line will contain another 4 integers that define another grid which follows. The end of the file is indicated if at least one of the integers is 0.

For each grid in the input file there should be one line in the output file. Either the robot follows a certain number of instructions and exits the grid on any one of the four sides or the robot follows the instructions and enters an infinite loop. The output line should either report the number of instructions found prior to the robots exit or the number of instructions found before entering an infinite loop. In the latter case, the output should also report the number of instructions contained in the loop. The output should follow the format used in the sample output file shown below. Notice the use of singular and plural cases.

## Sample Input File

```
3 6 1 5
NEESWE
WWWESS
SNWWWW
4 5 1 1
SESWE
EESNW
NWEEN
EWSEN
1 6 1 1
EEEEWN
3 3 1 2
ENW
SSS
EWE
3 3 2 3
ENW
SSS
EWW
0 0 0 0
```

## Sample Output File

```
10 instructions before exit
3 instructions before a loop of 8 instructions
3 instructions before a loop of 2 instructions
1 instruction before exit
2 instructions before a loop of 2 instructions
```