Lawn Mower Control

Susan has just purchased a new XQ7-1000 automatic lawn mower to mow her yard. These mowers work with the help of a control program which tells the mower how to move through the yard. Once the control program is activated, the mower follows the instructions therein, leaving a trail of beautifully cut grass and its owner free to enjoy a leisure-time activity of their choice. At the end of the program, the mower halts and turns itself off.

These mowers operate as stack-based machines where each instruction in the control program causes the mower to take some action. The stack of the mower is initially empty and can hold up to 100 integer values. The XQ7-1000 model supports the following instructions in its control programs:

Instruction	**Meaning**
push [value]	Pushes the given integer value onto the stack.
add	Pops the top two values off the stack and adds them, putting the result on the stack.
move	Pops the top value off the stack and moves the mower by that number of meters. If the value is positive, the mower should move forward; if negative, it should move backward.
turn	Pops the top value off the stack and turns the mower by that angle. The value will always be a multiple of 90. Positive values turn the mower to its left and negative values turn it to its right.
branch [line]	If the top value on the stack is non-zero, control transfers to the given line of the program. If the top value is zero, the instruction does nothing. This instruction does not modify the stack. Lines are numbered starting from 0.
halt	Stops the mower and ends the control program.

When the mower begins operation, it starts by executing the first line in the control program, and continues on executing them one by one until it halts. Along the way, the move and turn instructions will cause the mower to move throughout its environment.

Susan has written several of these control programs for the new mower, and wants to know where each one will leave the mower when they eventually end. Your job is to write a program that will read in a mower control program and report the final position of the mower once it has finished, relative to where it starts.

When the mower begins execution, it is at the (0, 0) origin point of a coordinate system, facing in the positive direction along the Y-axis. You may assume that the control program consists of fewer than 100 lines, and will always halt eventually. You may also assume that each branch instruction will specify a valid line number.

Input

The input consists of multiple control programs. The first line of input for each program will consist of an integer *N*, giving the number of lines in the program. Following will be *N* lines, each giving one line of the control program in the format given above. If *N* is 0, that indicates there are no more control programs to test.

Output

The output should consist of one line for each control program being tested. Each of these output lines should report the final position of the mower relative to where it started in (X, Y) coordinates.

Example Input

```
13
push 3
push 1
move
push 270
turn
push 2
move
push 90
turn
push -1
add
branch 1
halt
0
```

Example Output

```
Mower halts at (6, 3).
```

Visualization of Example input