

Lightbot Functions

Goal: The purpose of this exercise is to learn how to express a function symbolically. You will write functions and a program to demonstrate your understanding of using these concepts.

This assignment is a continuation of the last assignment when you programmed the Lightbot symbolically, with text instructions instead of iconographic instructions.



Step (S)



Left (L)



Right (R)



Jump (J)



Power (P)



F.name

We also introduced iteration (repeating operations), as in 4: (S)

Symbolic Function Definitions

When we define functions symbolically we use a special form. For the function definition, we write the name, a pair of parentheses, the operation sequence, and end it with a period. For example, this is a function definition for a function that turns the bot around:

```
F.turnaround() R,R.
  name          body
```

The *name* of the function is the part between the dot and the open parenthesis, in this case, turnaround. The part after the closing parenthesis and before the period is called the *body*. It defines what the function does.

To make the function happen, we need to "call" it. To call the function you give the name, followed by the parentheses, as in `turnaround()`, which instructs the bot to perform the instructions in the body of the function.

For example, to program the bot to "turn around and jump", we would write the program:

```
turnaround(), J.
```

Notice that a single function like `turnaround()` has two roles: in one role it is defined; in the other role it is called. **A function has only one definition, but can be called many times.**

Example: The Moon Walk

The bot version of the Moonwalk function is below.

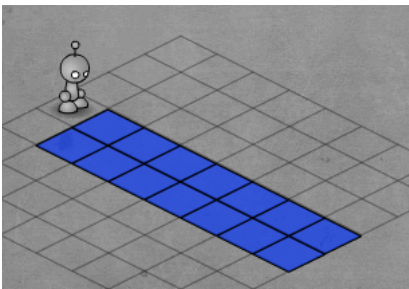
```
F.moonwalk() 4:(S, R).
```

According to the function body, the bot's Moonwalk is four repeats of taking a step (and not going anywhere) and then turning right. To use the moonwalk() function after jumping up two steps, for example, we could write:

```
J, J, moonwalk().
```

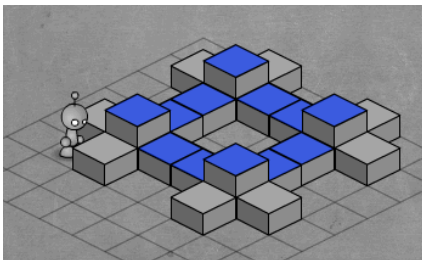
Exercises

A: Consider a different solution to problem (C) from Symbolic Lightbot. Write out the definition of a function `light_a_pair()` such that the program `7:light_a_pair()` solves the problem shown below.



B: The program below ends with the instruction `4:light_a_side()`. Write the `F.light_a_side` function definition so that the program works. Your function will probably take about seven instructions.

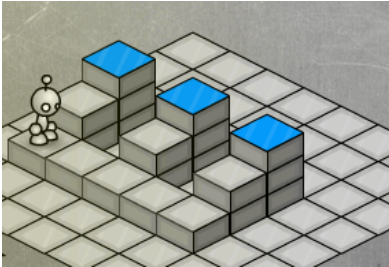
```
J, L, J, R, 4:light_a_side().
```



Name: _____

Moonwalk

C: The Lightbot wants a new solution to the Basic Level 6 (shown below) where it goes up each riser and does the Moonwalk defined previously on the top of the riser *before* powering the light.



Define a new function below called `stairMoonwalk()`, where the bot goes up the stairs and does the moonwalk:

Now write out a program below that solves the entire level using your new `stairMoonwalk()` function:

To Turn In

Scan pages 2 and 3 of this document and upload them to Lightbot Functions assignment on Canvas.