Problem 14

Walking through the “Additional Explanation” section

First we need to take the input and requirements into consideration.

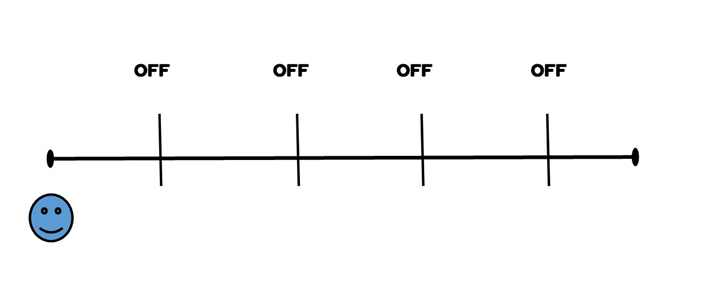
The input is equal to the total number of bulbs in the corridor. If you see a 0 (zero), then that is the end of the input, and it should not be processed.

The requirements are:

1. All the lights are OFF before this guy starts his walk.
2. Every time (i) this guy walks the corridor, he ONLY switches the bulbs where the number is divisible by i.
3. He does NOT touch any switches when he heads back down the corridor to the beginning.

According to the “Additional Explanation” section of the problem sheet, what will be your output when your input (N) equals 4? Let’s walk through this here.

Imagine a line that represents the corridor and let’s see what happens when this guy walks the corridor:



The first time that the guy walks the corridor (i = 1), he will toggle all the bulbs (because every number is divisible by 1). This is listed in requirement 2 above.

Chart, box and whisker chart

Description automatically generated

Then because of requirement 3, the guy comes back down the hall, not touching anything.

Chart, box and whisker chart

Description automatically generated

The second time the guy walks the corridor (i=2), according to requirement 2, he will only toggle bulb 2 and bulb 4, since those are the two numbers that are divisible by 2.

Chart, box and whisker chart

Description automatically generated

Again, the guy comes back down the corridor, not touching anything, according to requirement 3.

Chart, box and whisker chart

Description automatically generated

The third time walking the corridor (i = 3), he will only toggle bulb 3, since this is the only number divisible by 3.

Chart, box and whisker chart

Description automatically generated

Again, the guy comes back down the corridor, not touching anything.

Chart, box and whisker chart

Description automatically generated

The fourth time walking the corridor (i = 4), he will only toggle bulb 4, since this is the only number divisible by 4.

Chart, box and whisker chart

Description automatically generated

Again, he comes back down the corridor, touching nothing.

Chart, box and whisker chart

Description automatically generated

What is the state of that fourth bulb after his final time up and down the corridor? If the bulb is ON, then the output should be “Yes”. If it is OFF, then the output should be “No”.

Looking at the picture above, the last bulb is ON; therefore, the output of the program (for N = 4) is Yes.

Here are some things to ask yourself to help you write your code:

* What is the stop condition?
* Are there any error conditions?
* What variables do you need to know for this program?
* How do you **repeat** this walk multiple times?
* How do you check if a number is divisible by something?