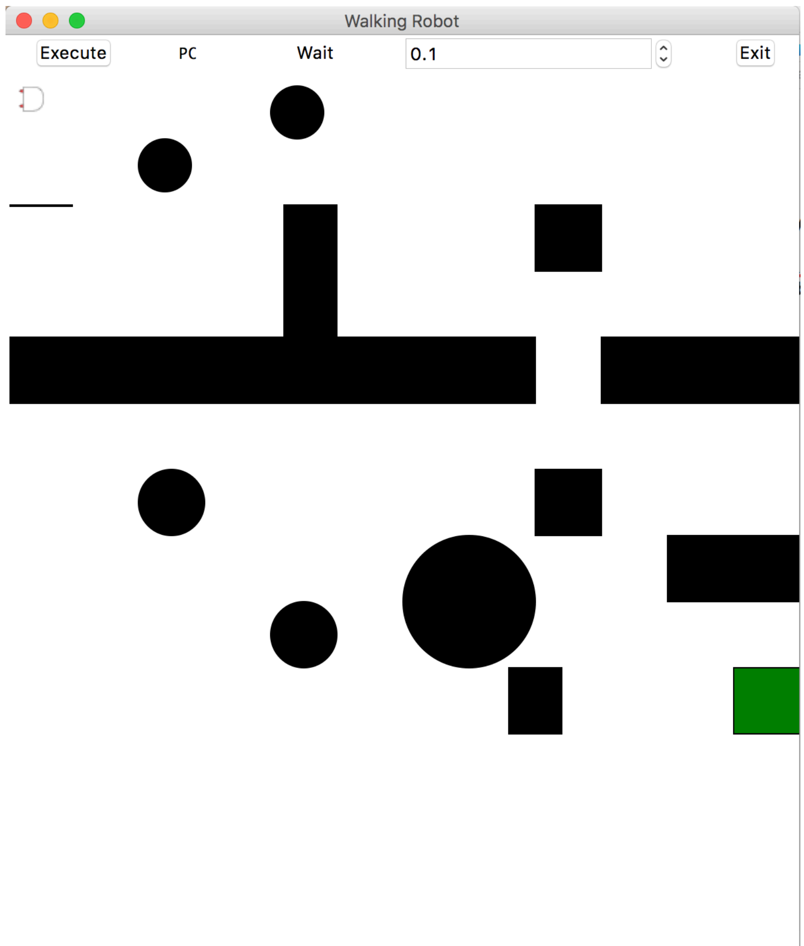
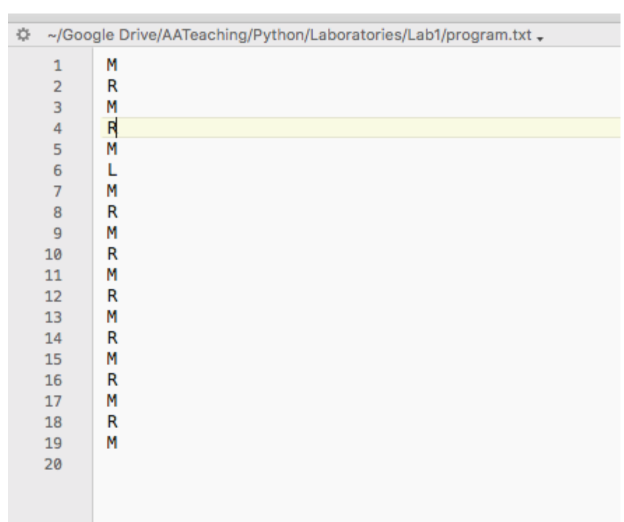
Laboratory 1 COSC 1010 August 28/30 2018

1. Download and unzip Lab1.zip. Open the file `walking.py` in Idle or even better, in a command window, go to the directory where you unzipped Lab1.zip and execute `python3 walking.py`. (The name for python3 might change depending on your system setup. You can always type in `python3 -V` in order to see whether you have Python 3 installed under this name. You should see a window like the one below:



On the top line you see three buttons (Execute, a Spin-box, and Exit). When you execute the program (by clicking on the Execute button), the file `program.txt` is executed. You control the behavior of the "robot" by changing the instructions in `program.txt` using any text editor you like. You can set the speed of the instruction execution using the Spin-box. Initially, you want a value around 1.0 seconds.



Your task is to change the program such that the robot moves to the green field without running into an obstacle. It takes about 100 - 150 instructions to do so.

The programming language for the robot is very simple. An M means move in the current direction, an R means move to the right by 45^o and an L means move to the left by the same amount. (A real robot would have to follow the rules of mechanic and cannot oscillate between traveling at speed and standing to change direction.)

2. Hero's (or the Babylonian) algorithm calculates the square root of S by making an initial, positive estimatex_0. It then improves on a previous estimate x_1 by calculating

$$x_{i+1} = \frac{1}{2}(x_i + \frac{S}{x_i}) .$$

For example, if we want to calculate the square-root of three, we calculate

$$\begin{aligned} x_0 &= 1, \\ x_1 &= \frac{1}{2}(1 + \frac{3}{1}) = 2, \\ x_2 &= \frac{1}{2}(2 + \frac{3}{2}) = \frac{7}{4}, \\ x_3 &= \frac{1}{2}(\frac{7}{4} + \frac{3}{\frac{7}{4}}) = \frac{97}{56}. \end{aligned}$$

Depending on the day of the lab, use either IDLE in order to calculate (an approximation of) the square-root of 5 in this manner, or write a Python script that does the same.

3. [ASCII art] Write a Python script containing print statements to print out one of the following pictures:

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