Problem F.4

Problem 220: Heighway Dragon

Due Date: 5/3/2019
Folder: `FinalProject`
File Name: `F4_Prob220_Name.py`
Points: 20 points

Problem Background

Begin by looking at the Project Euler page for this problem, Problem 220. We start with a two letter string, such as $D_0 =$ "Fa". We define a sequence of strings D_n iteratively by the rules:

- For every "a" in the string, replace it with the string "aRbFR"
- For every "b" in the string, replace it with the string "LFaLb"

Thus after every iteration, the string obviously get longer. An example of this iterative process is given on the Project Euler page.

The resulting string, after N iterations, can be interpreted as a sequence of commands for a graphics program. Imagine there is a bug sitting at the origin $(0, 0)$ facing up the positive y-axis. Each character of the string tells the bug to make one movement. A character of "F" tells the bug to move one unit forward, the character "L" tells the bug to turn 90 degrees to the left, and the character "R" tells the bug to turn 90 degrees to the right. The bug follows the instructions of the string, and as it moves it leaves behind a trail which can be plotted on the screen.

Your goal will be to draw this trail, following the instructions of the string D_N. You can then answer questions such as how the plot changes as you increase N. Also, how does the plot change if you change the initial string.

Program Criteria

Write a program that does the following:

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Deliverables

Place the following in a folder named `FinalProject` in your repository:

- A Python file `F4_Prob220_Name.py` that satisfies the program criteria.