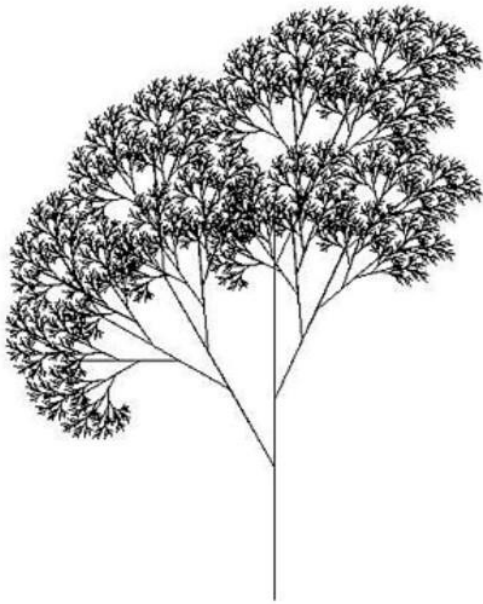


Lab 2

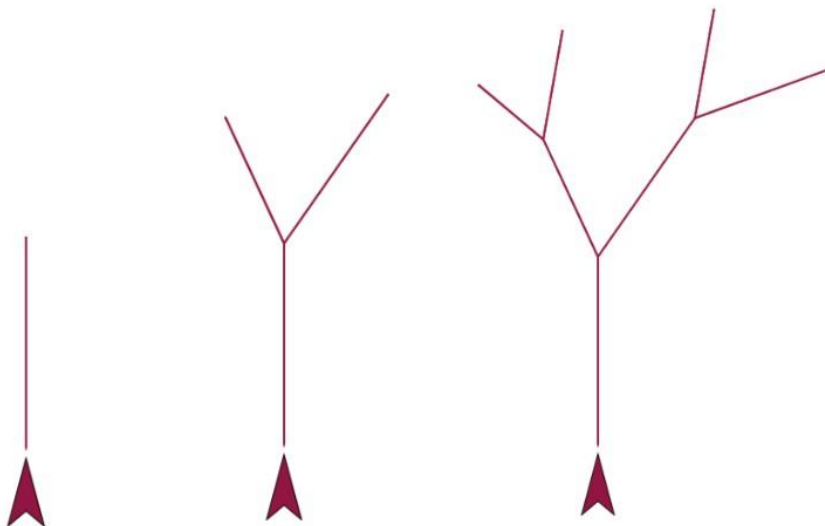
Answer question 1 in a file named *StudentID_Firstname_lab2_ans.pdf*, where *StudentID* is your KU ID and *Firstname* is your given name

1. Recursive Graphics

Recursion is all around you.



Consider how you can draw a tree with 1, 3, and 7 branches (think of branches as lines drawn)

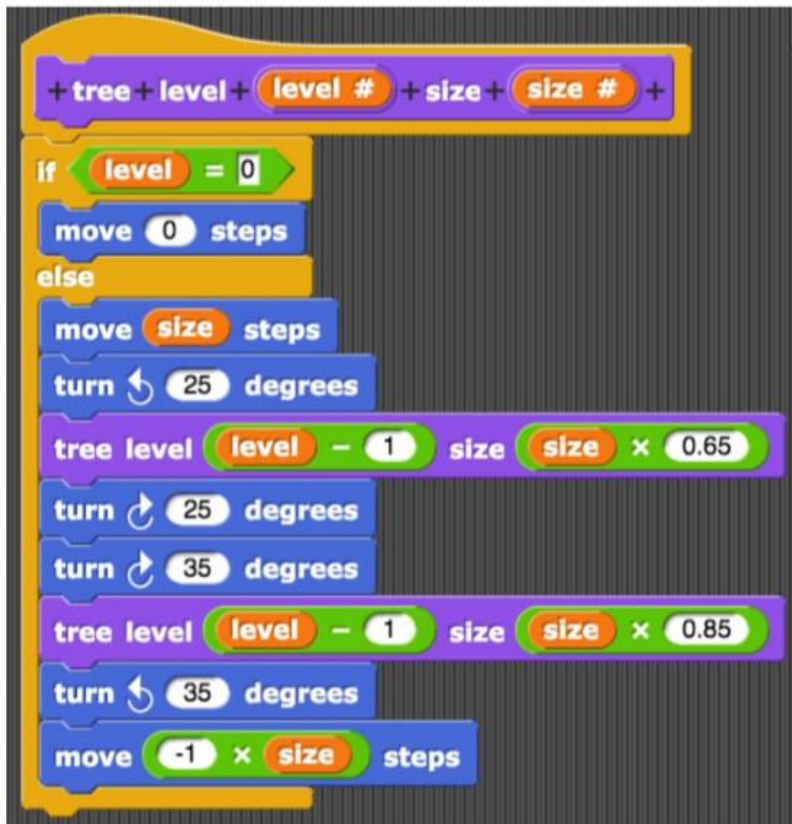


Notice that the drawing procedure is recursive in nature.

Goto:

<https://snap.berkeley.edu/snap/snap.html>

and try out the following code:



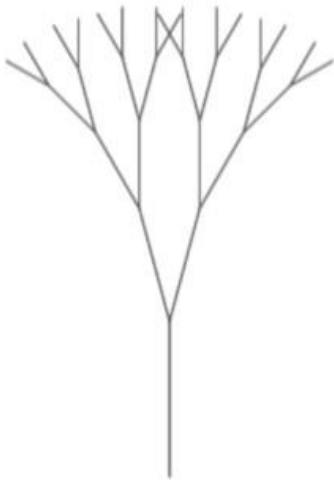
Then, answer the following questions to check your understanding:

- What happen if you change the size value to -100?
It's go upside down
- What happen if you change the input level to be -4?
It goes like spiral
- To produce a tree below, what are the values for levels, the two turn degrees, and the two constant multipliers for size during recursive calls

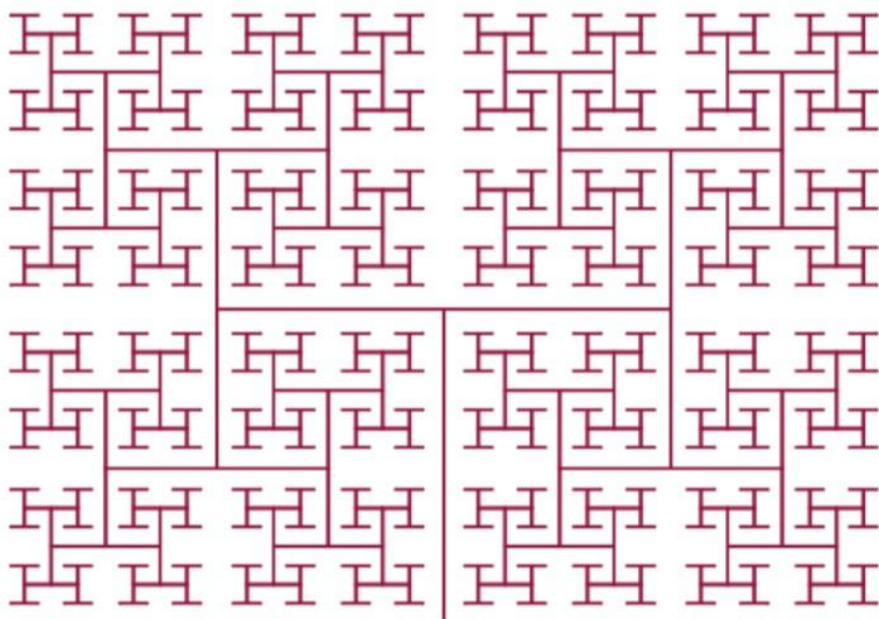
Level = 5

Two turn degree = 25

Size = 60



Study the code in `turtle_tree_draw.py` and run it. Then, modify it to produce an H-tree that looks like the following:



- What modification you have to make to the original code to produce the above H-tree?

```
import turtle

def tree_draw(level, size):
    if level == 0:
        return
    turtle.forward(size)
    turtle.left(90)
    tree_draw(level - 1, size*0.65)
    turtle.right(90)
    turtle.right(90)
    tree_draw(level - 1, size*0.65)
    turtle.left(90)
    turtle.forward(-1*size)
```

```
•
•
• turtle.speed(0)
• turtle.setheading(90)
• turtle.pensize(5)
• turtle.color('green')
• tree_draw(10, 200)
•
•
• turtle.done()
```

(For those who need an introduction to Python's Turtle graphics, see the attached turtle_graphic_intro.py file)

2. recursion_lab.py

Complete the missing code in recursion_lab.py and make sure that it passes all the test cases. **You must use recursion to get credit for this problem; no loops (while, for, etc.) allowed.**

Submission:

- **Create StudentID_Firstname_lab2 folder, where StudentID is your KU ID and Firstname is your given name**
- **Put the files to submit, StudentID_Firstname_lab1_ans.pdf and recursion_lab.py, into this folder**
- **Zip the folder and submit the zip file to the course's Google Classroom before the due date**