CS21: INTRODUCTION TO COMPUTER SCIENCE

Prof. Mathieson

Fall 2017

Swarthmore College

Outline Dec 8:

- Go over Quiz 5 (+ hand back Lab 8)
- Merge sort (recursive sorting)
- Fractal trees (recursive graphics)

Notes

•Office hours today! (**3-4:30pm**, need to leave early)
•Ninja session tonight
•Office hours next week: **Wed 2-4pm**
•Let me know if you would like to meet next week

Final Exam

Studying for the final

- Exam time: **Friday Dec 15** (week from today), **7-10pm**, Science Center 101
- We will post **study guide and review problems** today
- Go through all notes, code, and practice problems
- Write out as many problems as you can **on paper** (then check in atom)
- Go back over old quizzes and their study guides
- Create a **"cheat-sheet"** for yourself of important concepts and examples (even though you can't use it)
- Come to office hours on **Wed! 2-4pm**

Email me:

- If you would like a grade estimate before the final
- If you have any cool graphics recursion screenshots
- If there are any practice problem solutions you would like to see
- If you would like to meet before the final

Merge Sort

faster Sort

$n=8$ 8 2 5 7 | 1 6 4 3

call sort half1 — call sort half2

8 2 | 5 7 | 1 6 | 4 3

8 | 2 | 5 | 7 | 1 | 6 | 4 | 3

merge merge merge merge

2 8 | 5 7 | 1 6 | 3 4

merge merge

2 5 7 8 | 1 3 4 6

merge

1 2 3 4 5 6 7 8

$2^3 = 8$

split: $O(\log n)$

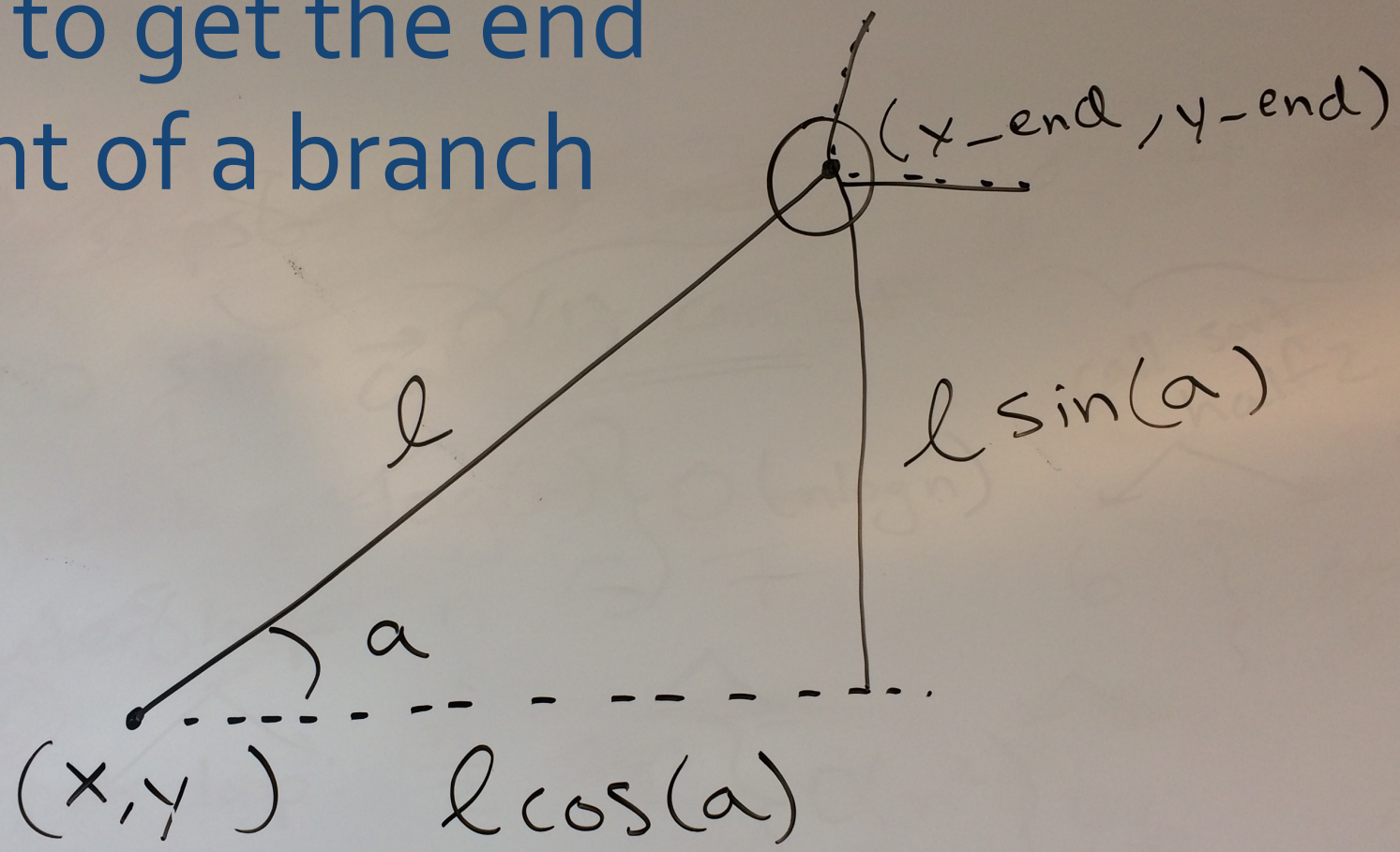
merge: $O(n)$

n

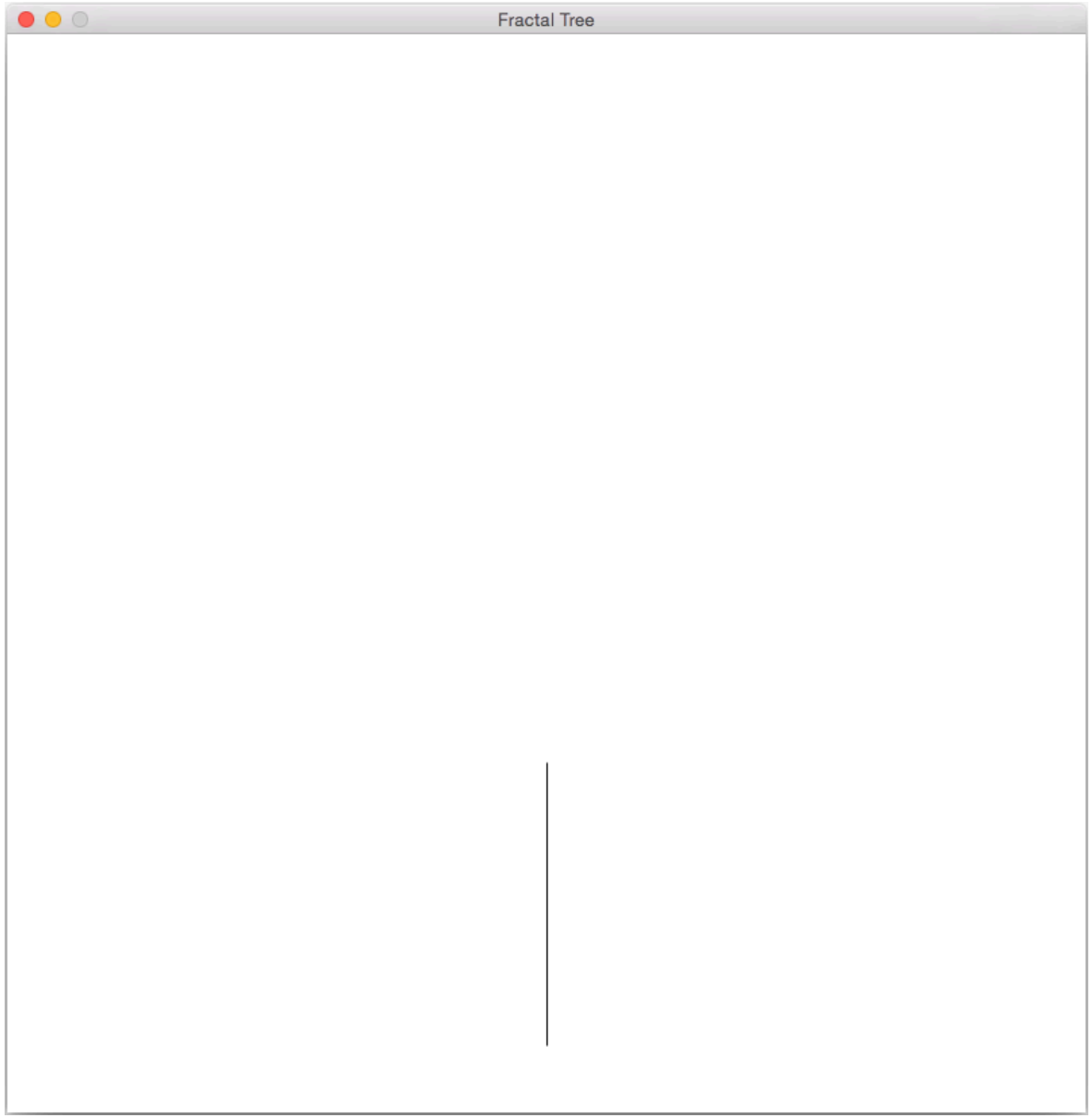
→ merge sort: $O(n \log$

Recursive Trees

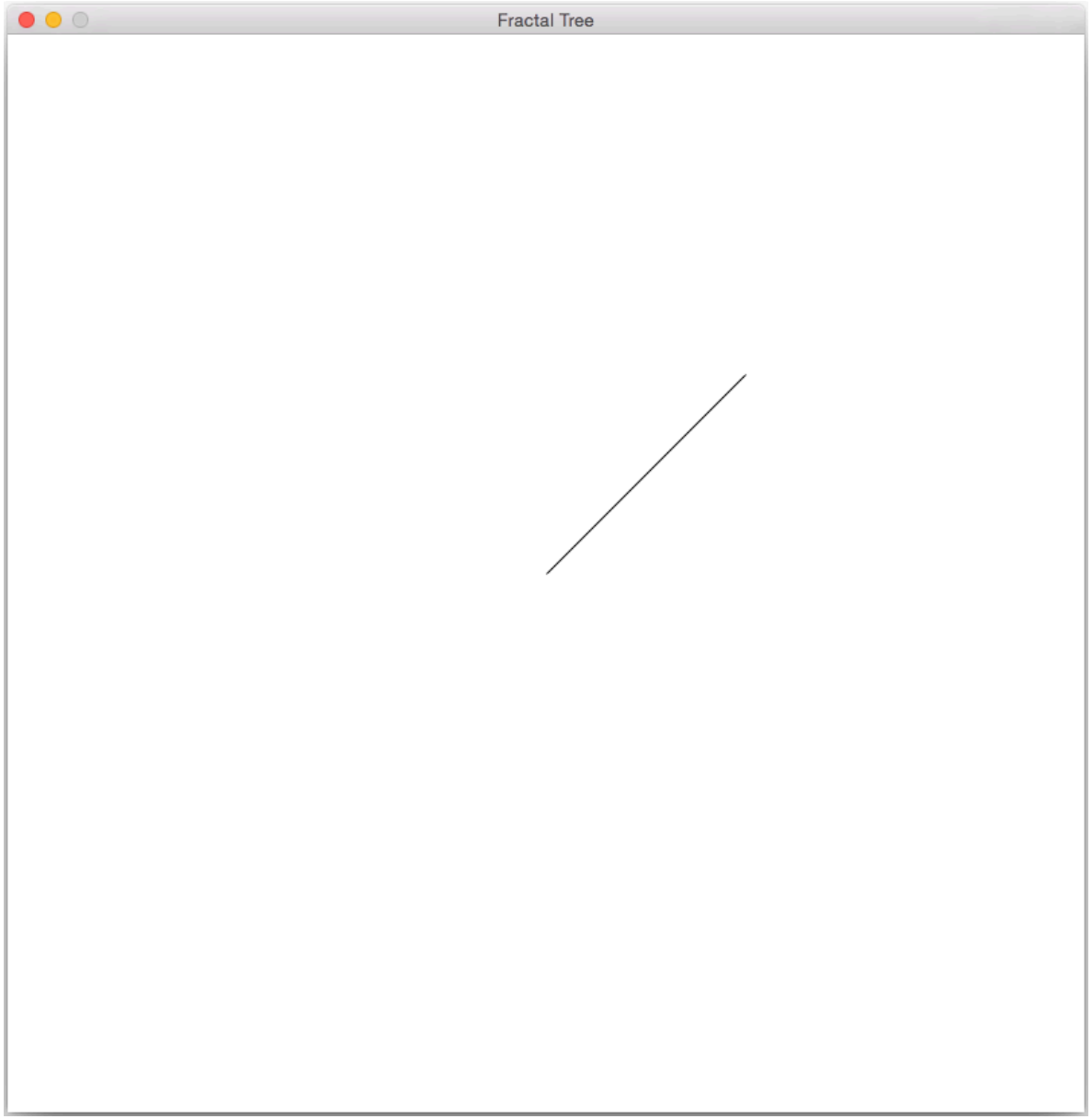
How to get the end point of a branch



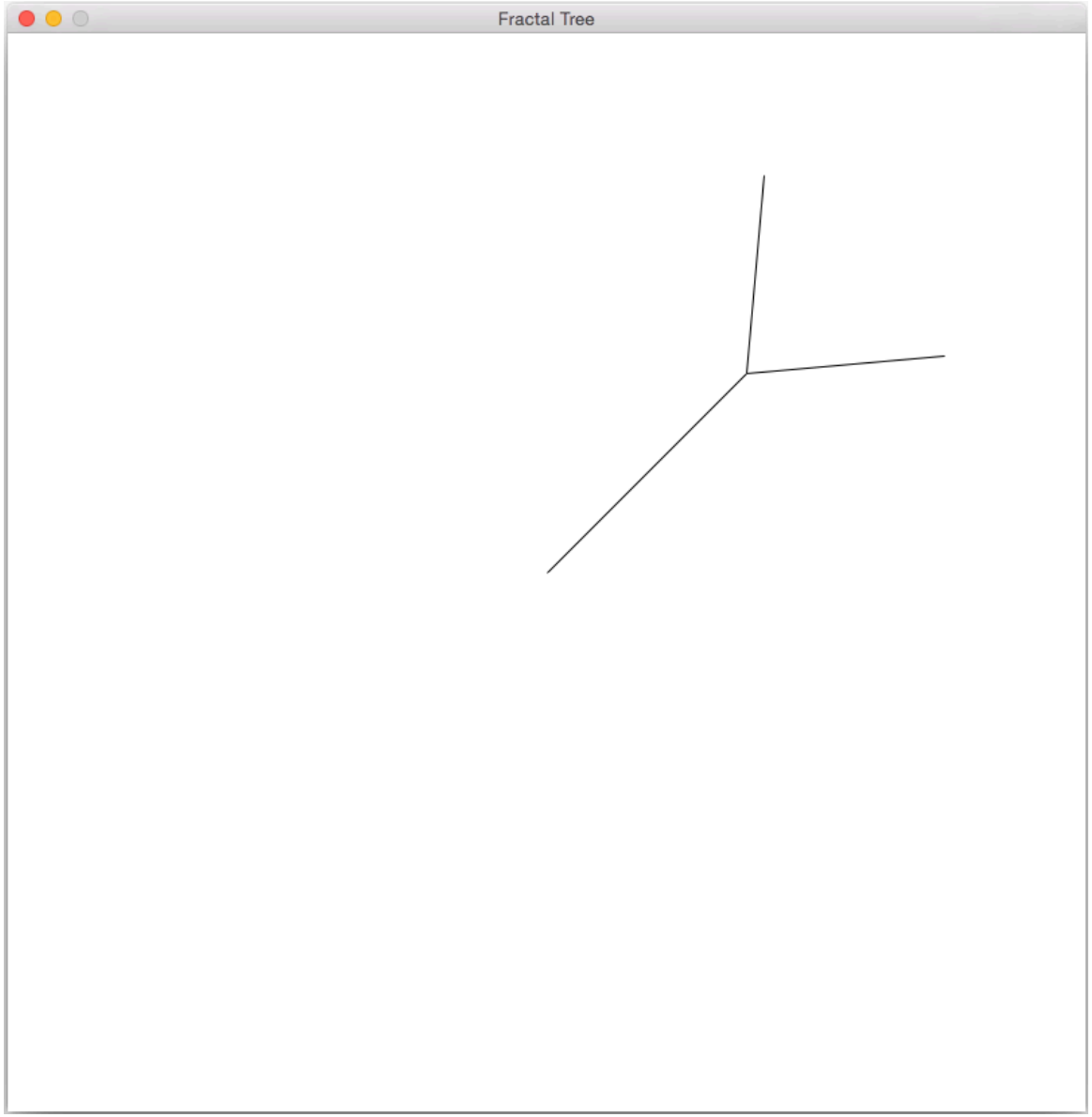
```
draw_tree(win, 0, 400, 750, 210, -math.pi/2)
```



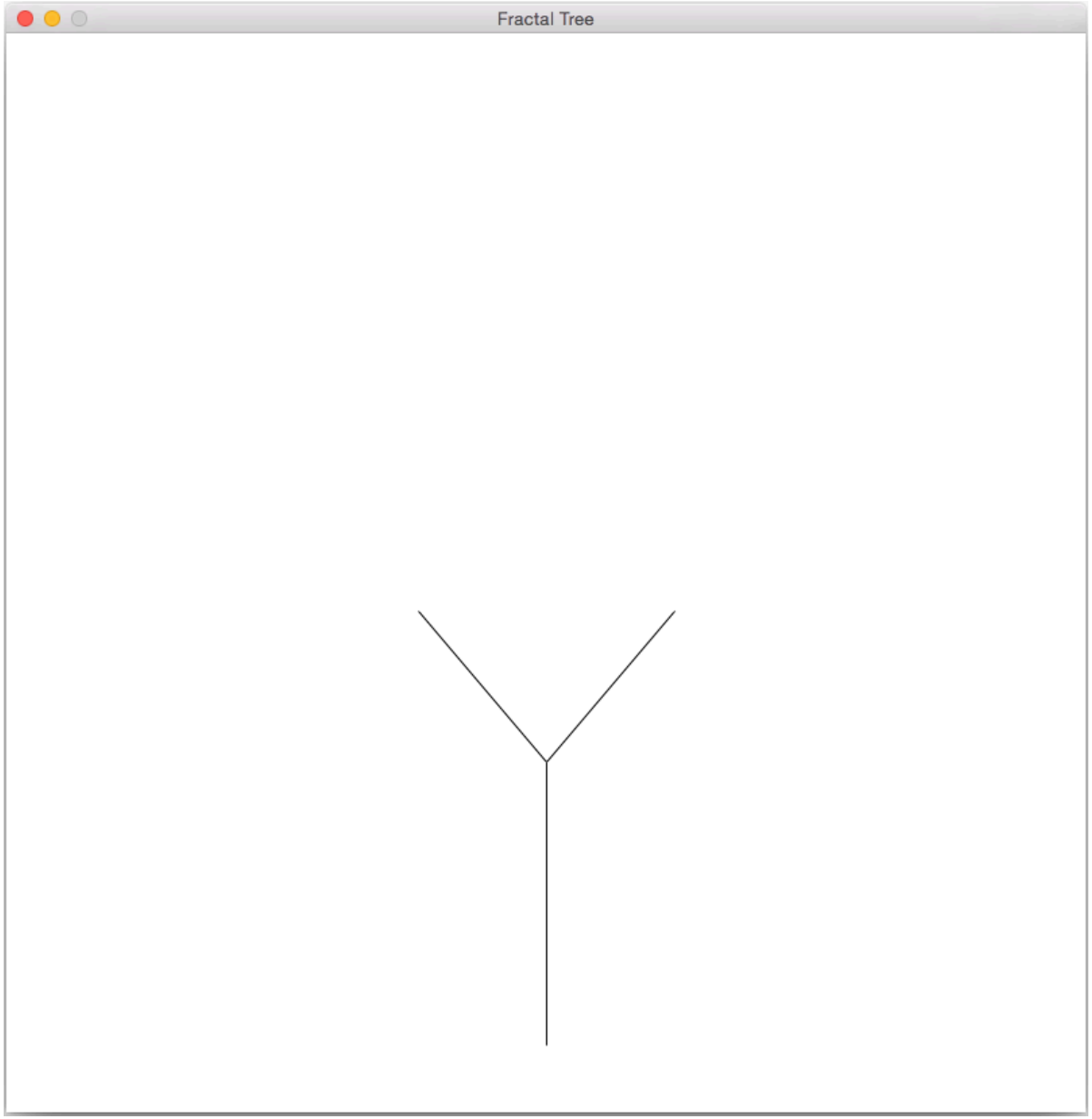
```
draw_tree(win, 0, 400, 400, 210, -math.pi/4)
```



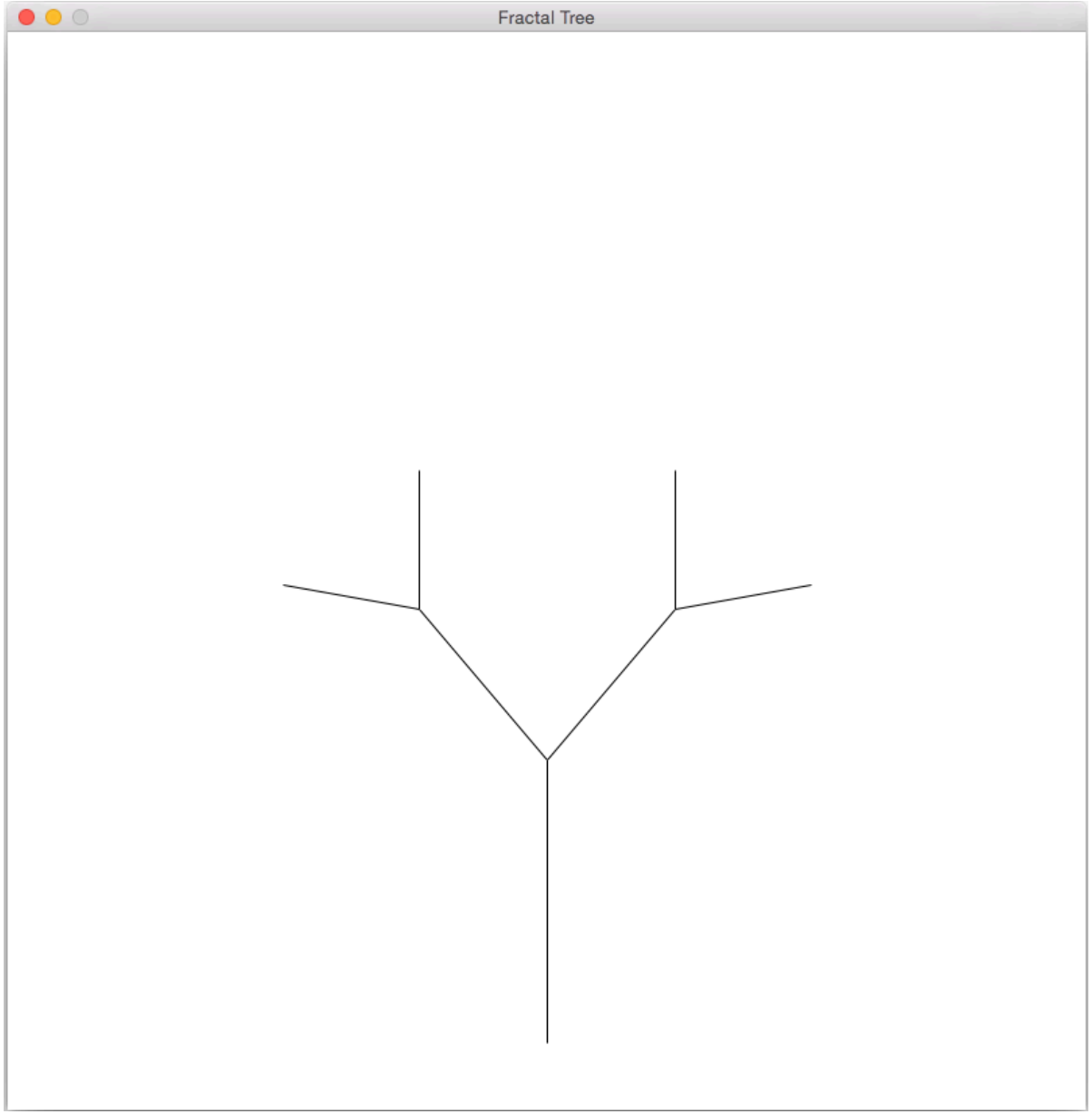
```
draw_tree(win, 1, 400, 400, 210, -math.pi/4)
```



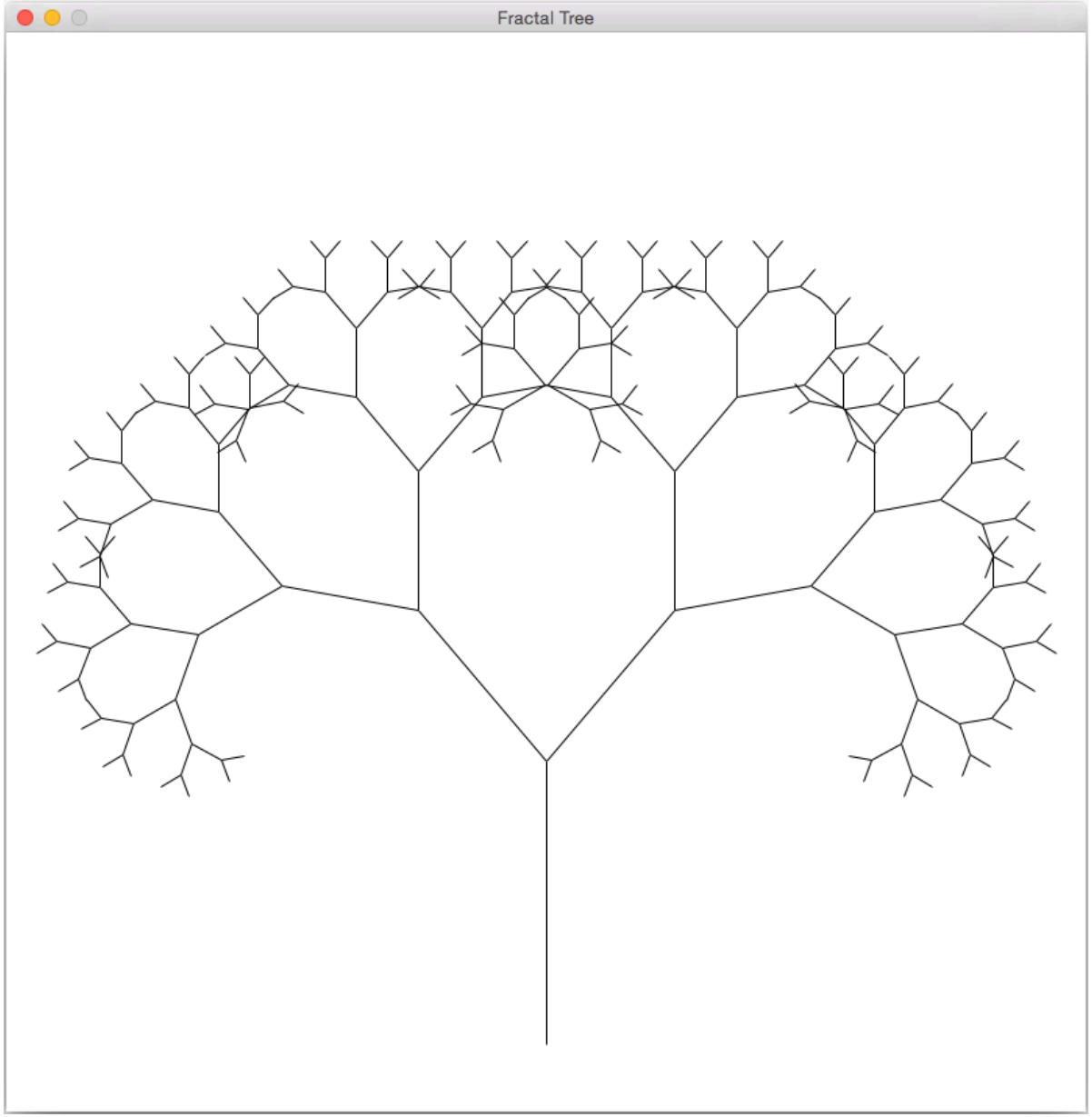
```
draw_tree(win, 1, 400, 750, 210, -math.pi/2)
```



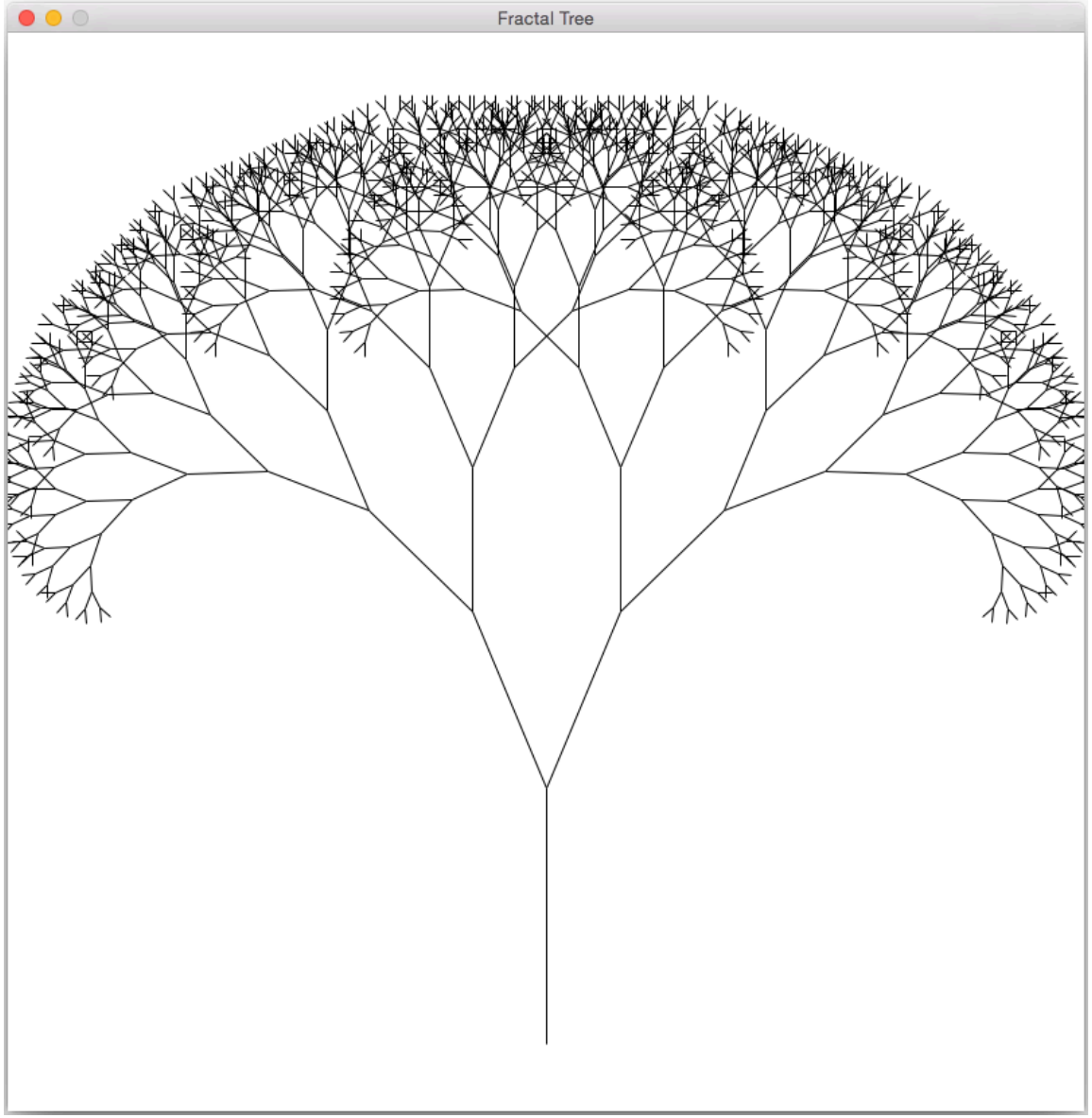
```
draw_tree(win, 2, 400, 750, 210, -math.pi/2)
```



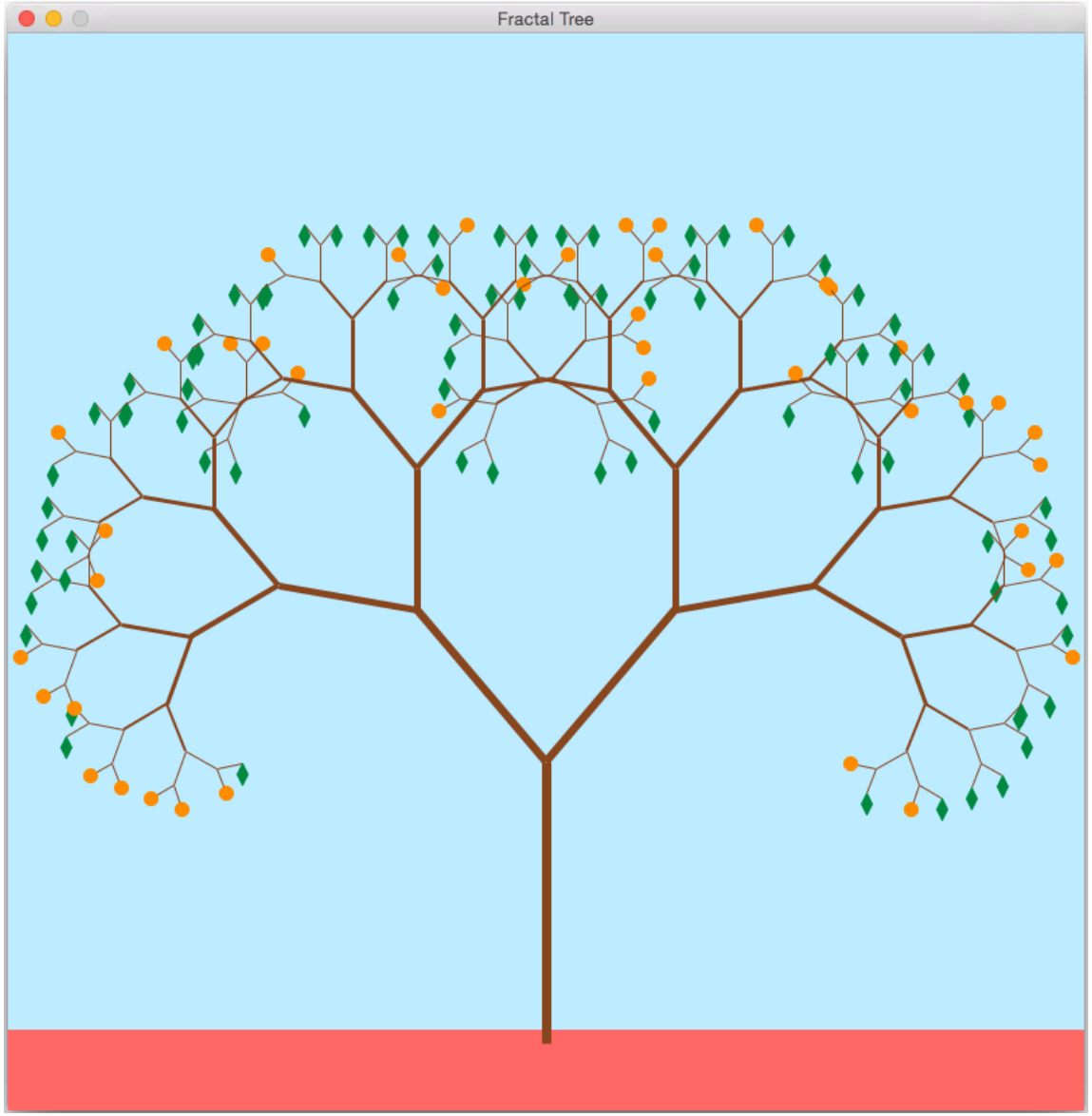
```
draw_tree(win, 7, 400, 750, 210, -math.pi/2)
```



Order = 10

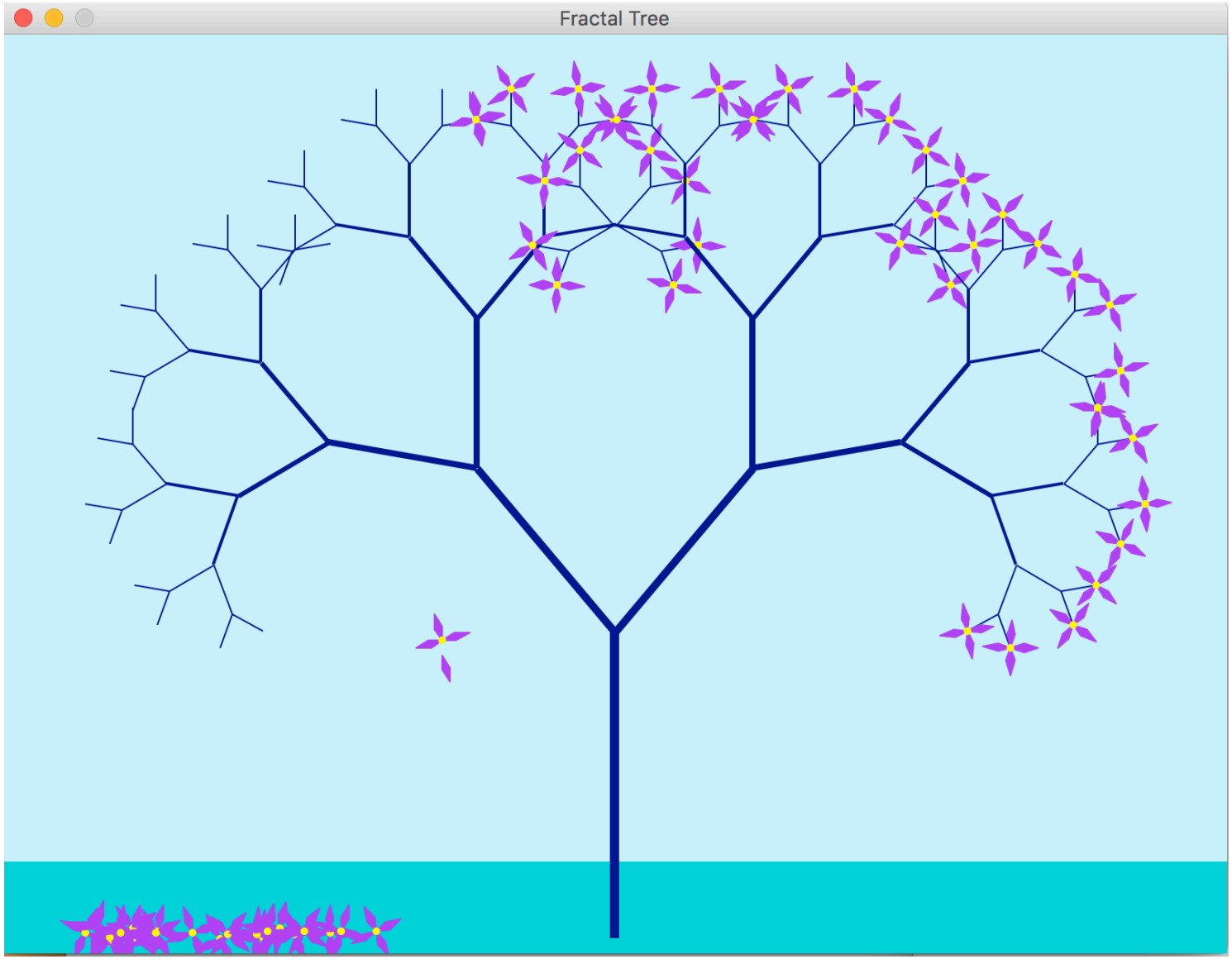


Example with oranges and leaves at the base case

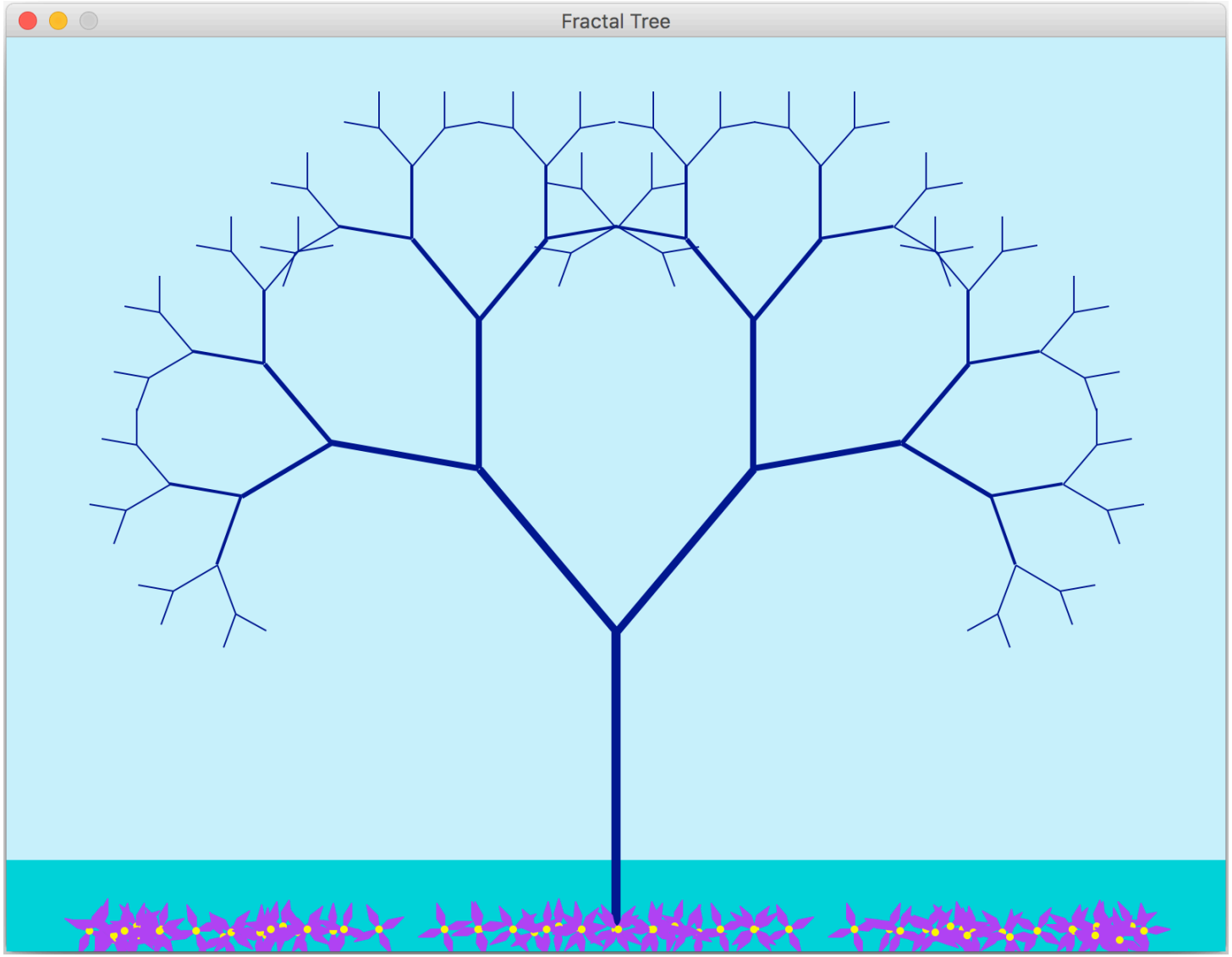


Example with falling flowers

```
flwr = Flower(x,y)
flwr.draw(window)
```



Example with falling flowers



Digital Humanities

Lab 8 (digital humanities) observations

Claudia
I learned that in most novels the word 'love' occurs more often than the word 'hate.'

Skylar
...Mary Shelley really liked the word "abhorred"... (:

Talia
It was interesting to see how many words with negative connotations were repeated in Frankenstein-- "repugnance" was used three times, for example, and "violence" eight. "Dead" occurs more than twice as many times as "alive."

Bayliss
Mary Shelley LOVES the words "misery" and "sad."

Kyle
"Love" is used often in Mary Shelley's Frankenstein.