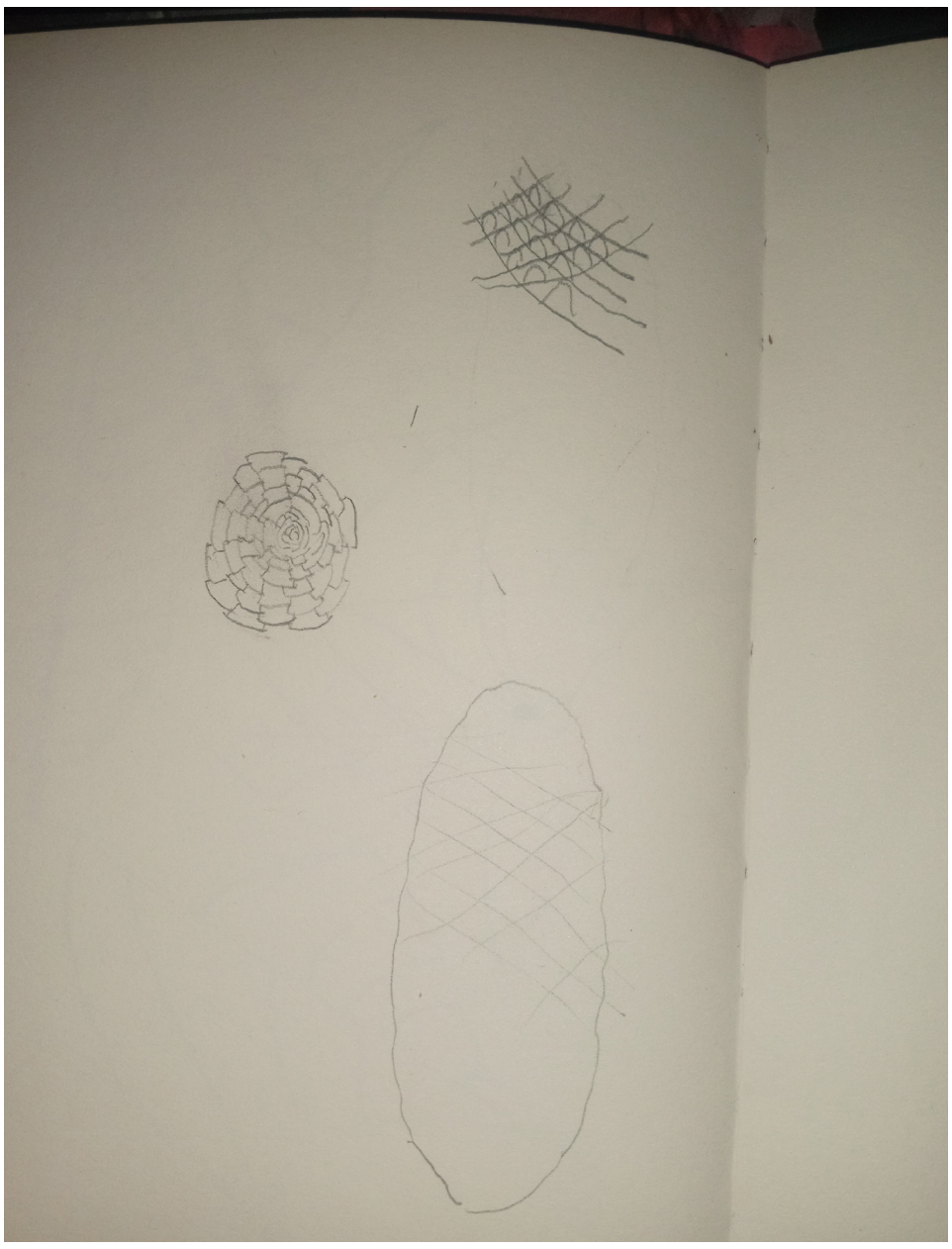
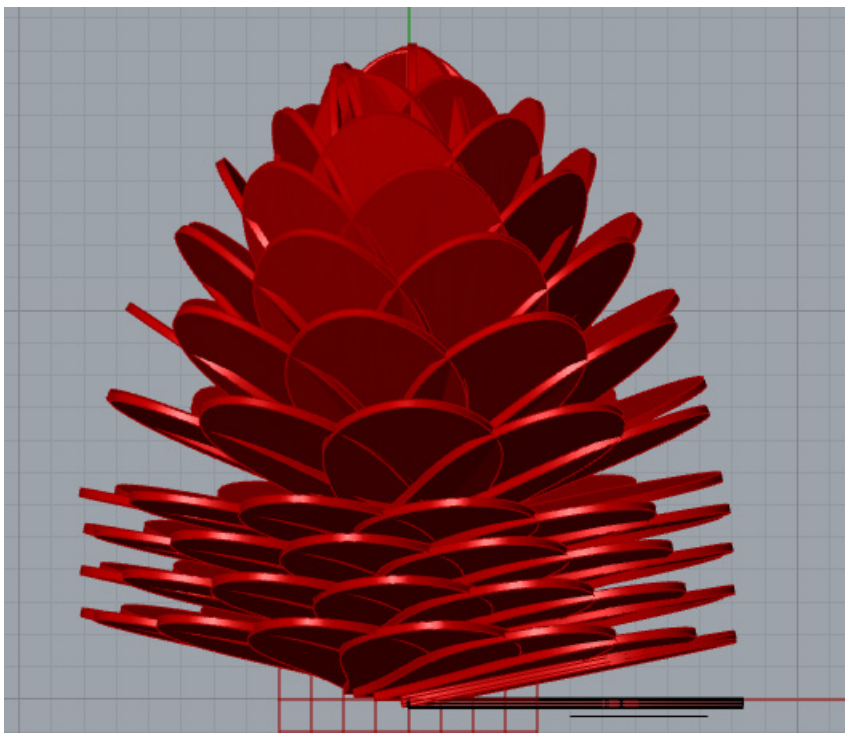


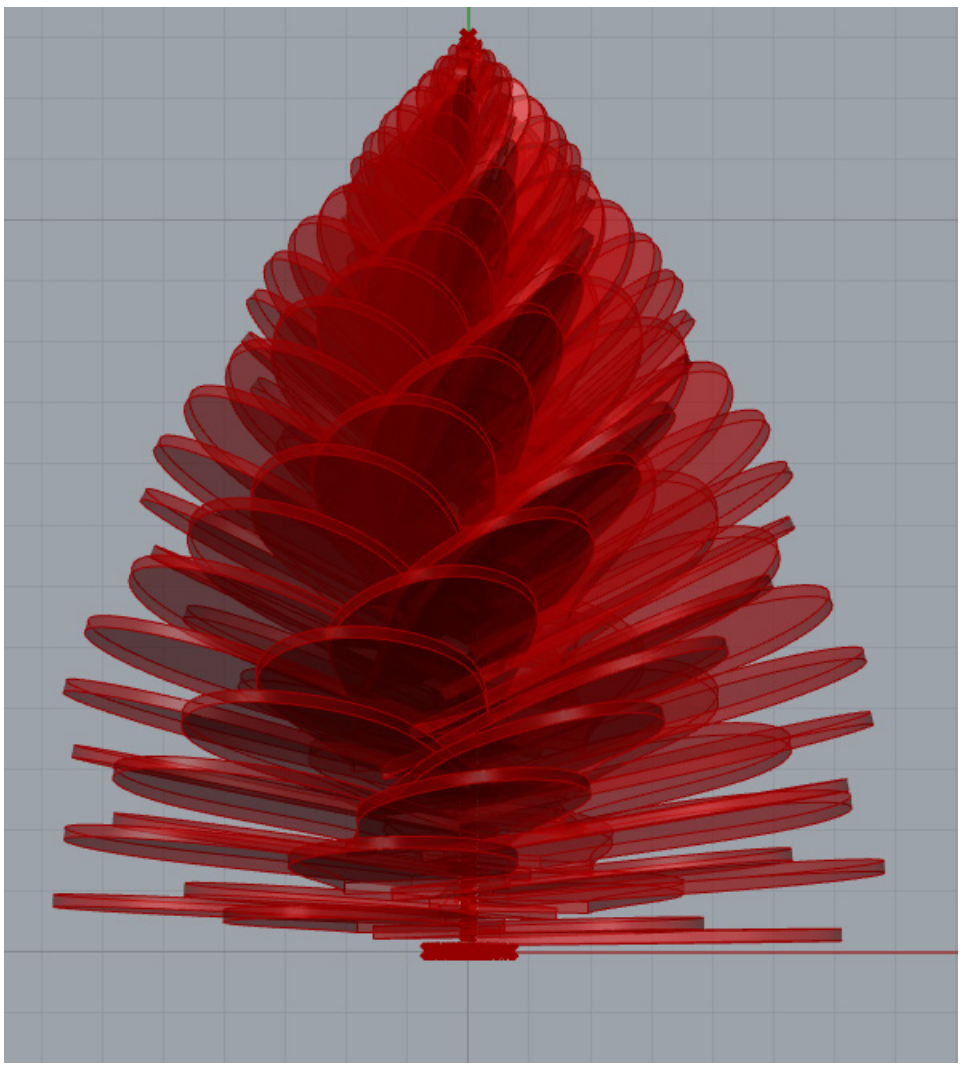
Initial Sketches

The goal to recreate a pinecone primarily came from my frustration when attempting to draw one for the first hand sketching assignment, further compounded by observing the differences in pinecones from various tree species, as these variations all still had the same basic organizational structure. Therefore, it was clear to me that these variations were parameters the simply differed between tree species and the pinecones themselves, meaning that this form lended itself well to parametric design.



First Iteration

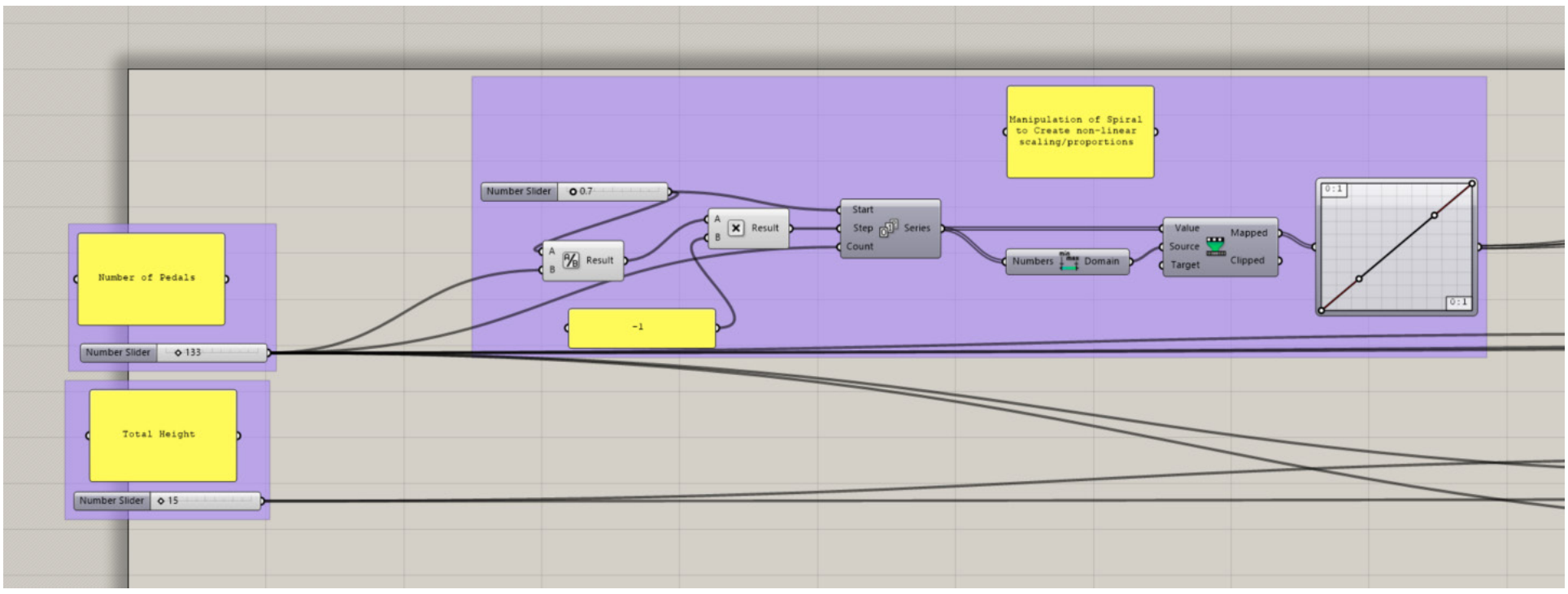
This was the result of my initial attempt, which while does resemble a pinecone, is made entirely from rotating, scaling and moving the same identical pedal geometry with series, without at all using the phyllotaxis spiral pattern that much of nature (including pinecones) use as the backbone for their pattern/structure. Additionally, when reviewing this version for this submission I noticed how poorly this definition ran, with small changes taking minutes at a time to update in rhino.

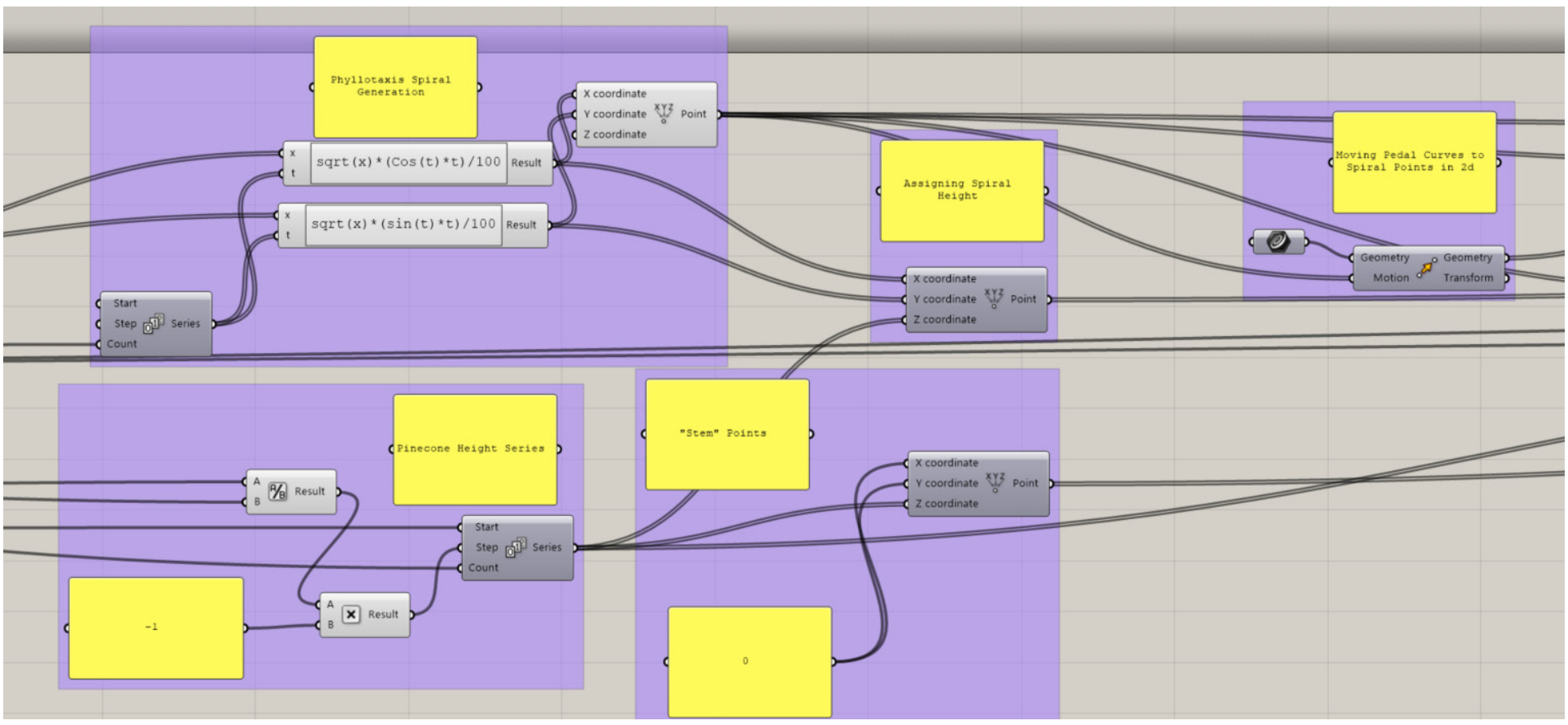


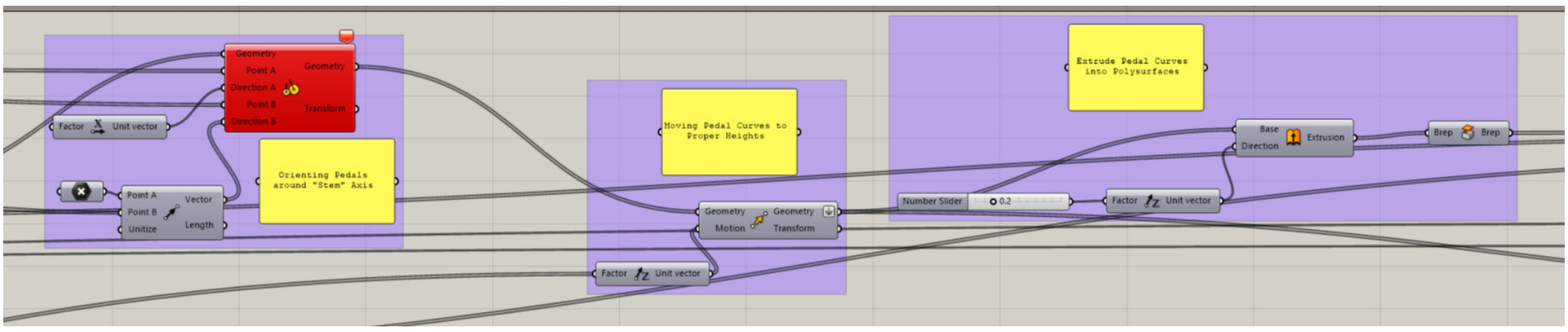
Final Iteration Result

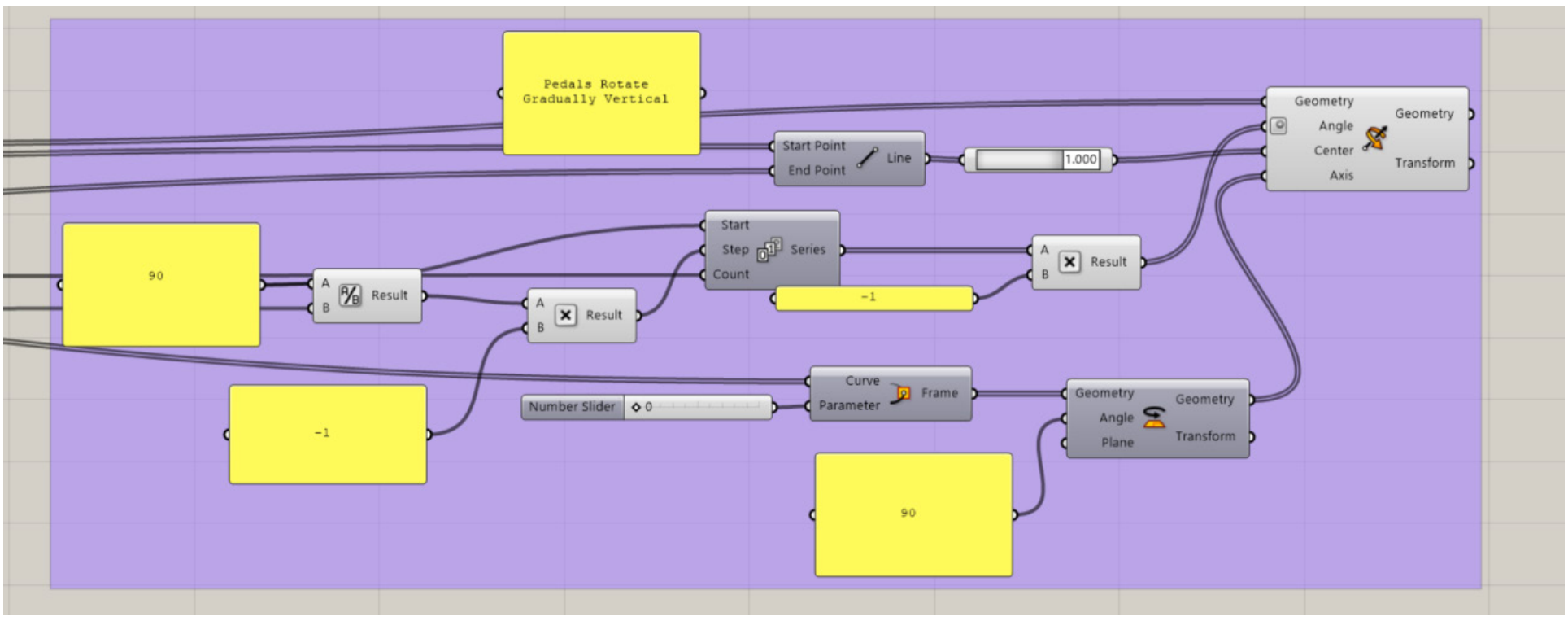
This is my final definition/result, which overall I am extremely happy with because of its flexibility (changing the parameters results of all manner of pinecones and other phyllotaxis patterns) but it's certainly still not perfect. The primary discrepancy between the results from this definition and a real pinecone I think is the pedal shape, as the pedals that make up the model are effectively 2d which is not true for real pinecones. Overall, this project introduced me to a number of new parametric tools including the expression node. Understanding how to use the mathematical expression for phyllotaxis was the missing link between this iteration and the previous one, as it let me directly interact and modify how real pinecone structures are organized. This process has definitely changed my thinking towards parametric design, as while I caught on very quickly how math drives the geometry in grasshopper, I am far more aware of how complex equations can be used to quickly create sophisticated geometry.

Final Iteration Definition

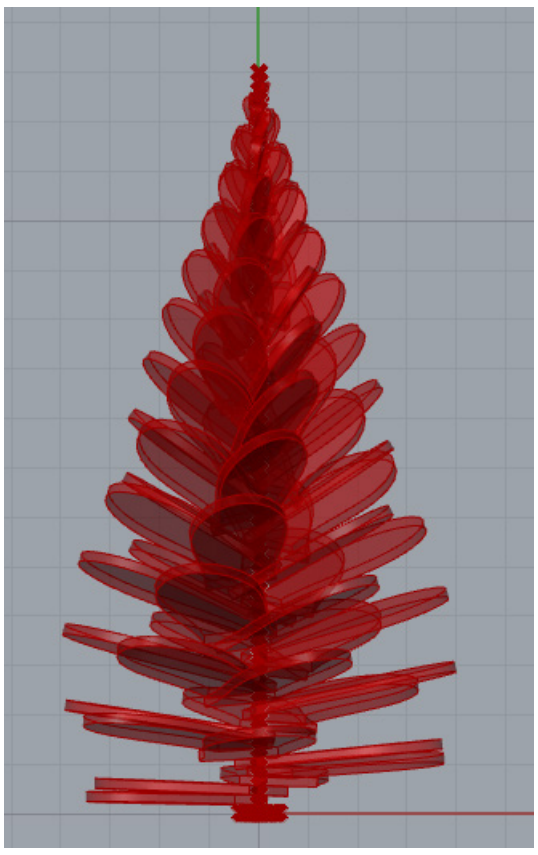




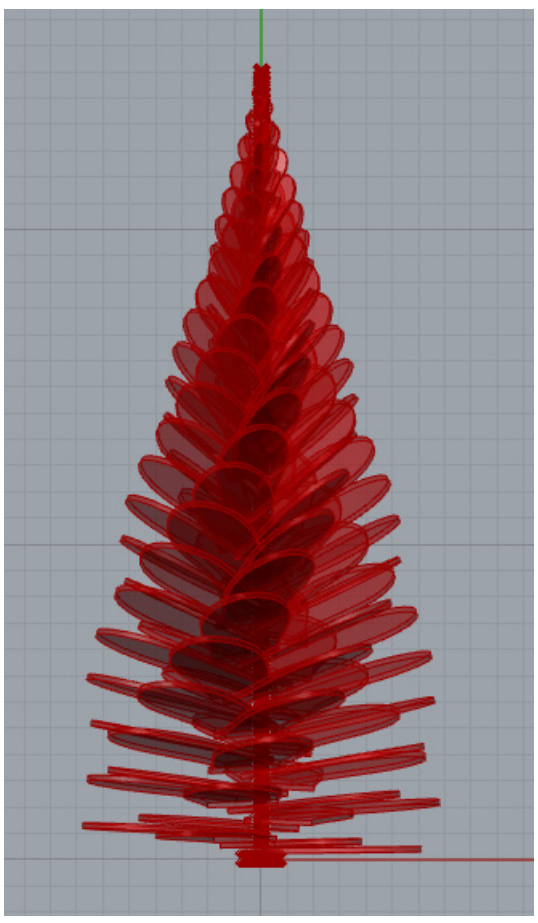




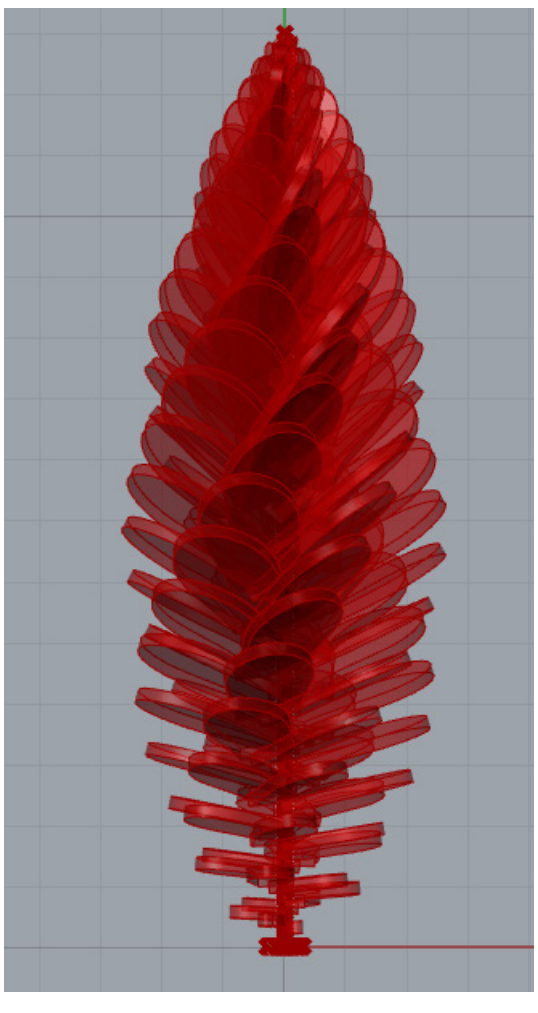
Parametric Variations



Decreased Pedal Count



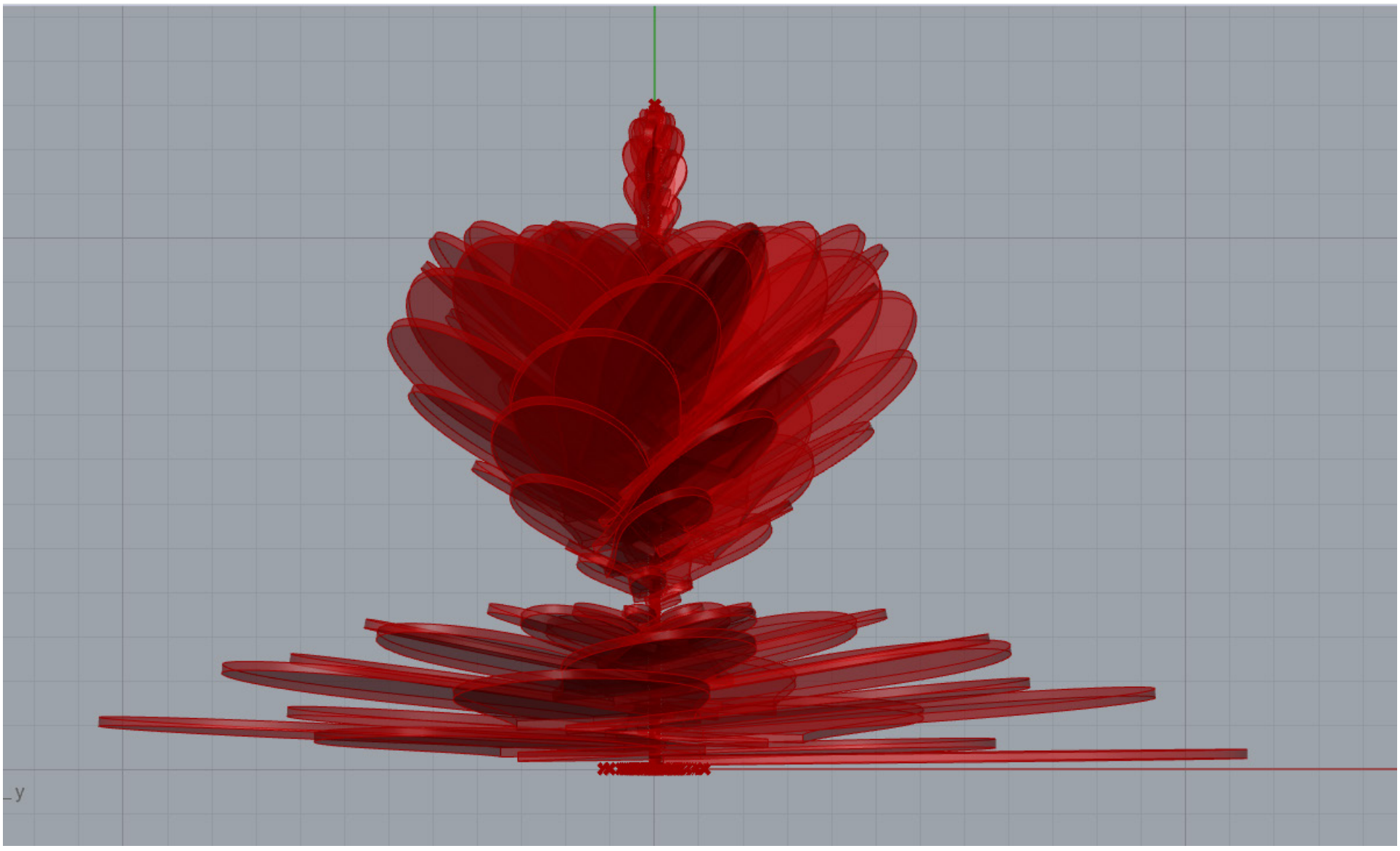
Increased Total Height

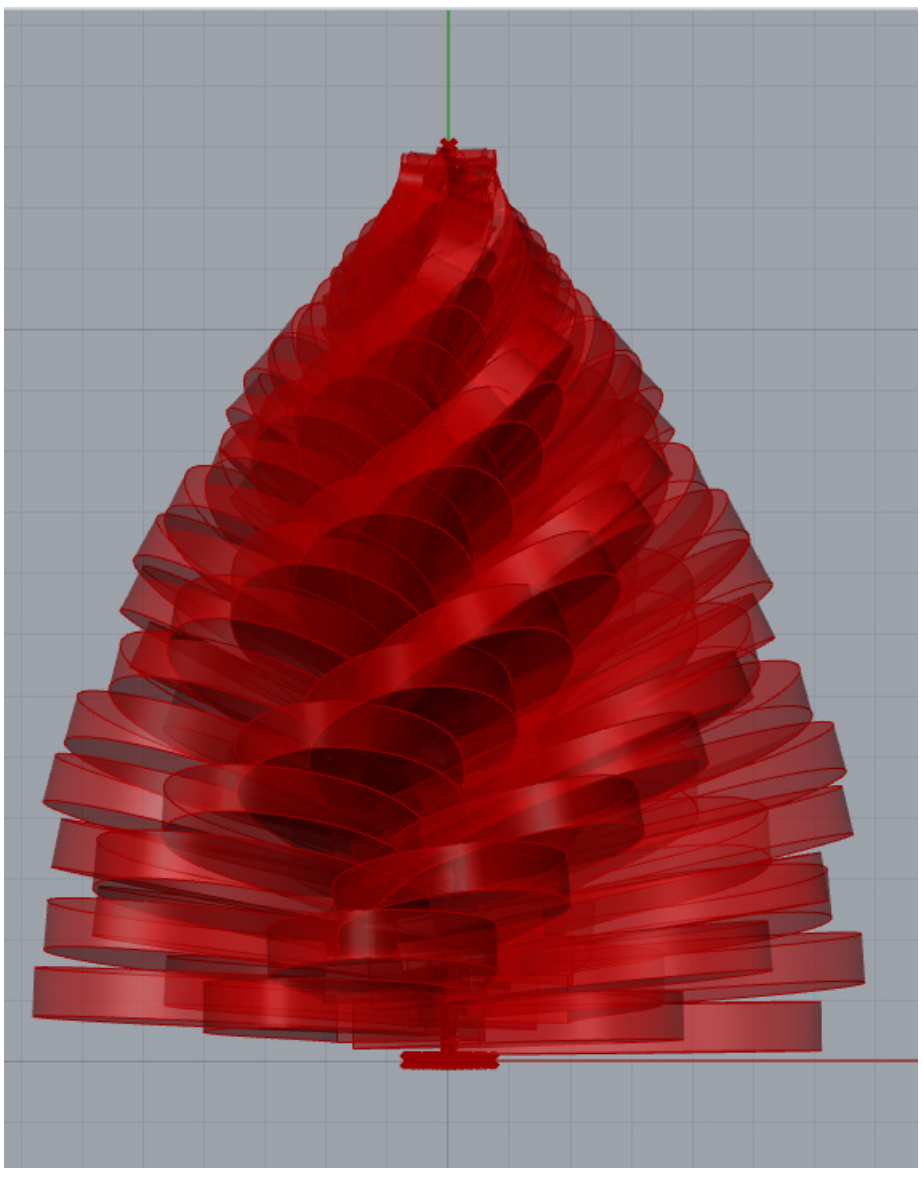


Modified Spiral Via Bezier Graph through Graphmapper

Parametric Variations

Modified Spiral Via Sin Graph through Graphmapper





Increased Pedal Thickness