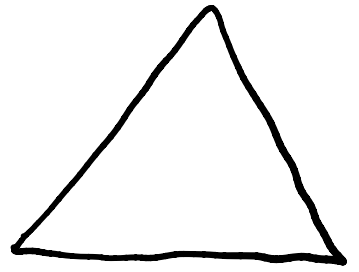


Lecture 27: L-systems

Koch Snowflake

- Start with **Initial Shape** in mind that turtle will draw:



- Represent initial shape using a String: 'F++F++F']

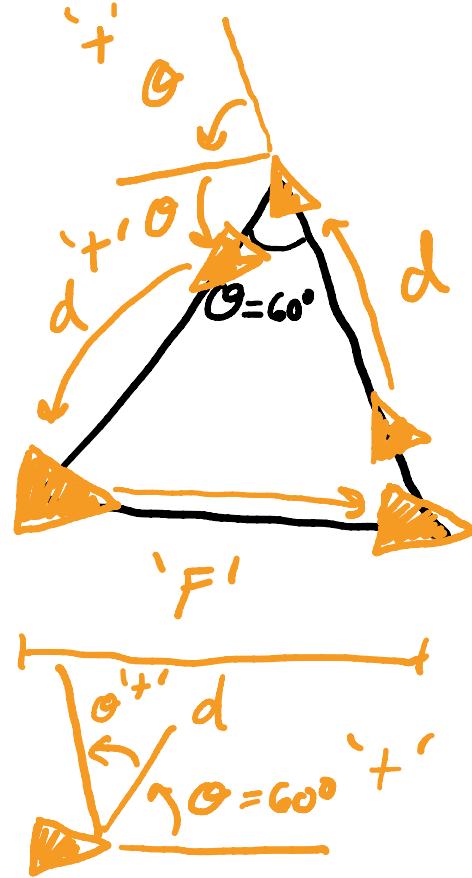
draws initial shape

base string

Each character is interpreted as a Command used to move turtle:

- 'F' means turtle move forward by a **distance d**
- '-' means turtle turn right by an **angle θ** .
- '+' means turtle turn left by an **angle θ** .

Symbols represent **L-system alphabet**



- d Can be anything for Koch Snowflake
 - θ Should be **60°**
- different for different L-systems
- for Koch Snowflake

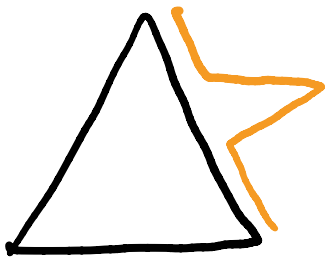
We apply replacement rules some number of times to make the snowflake fractal

Replacement rule composed of:

1) Find string — e.g. 'F' ← every occurrence of this

2) Replace string — e.g. 'F-F++F-F'

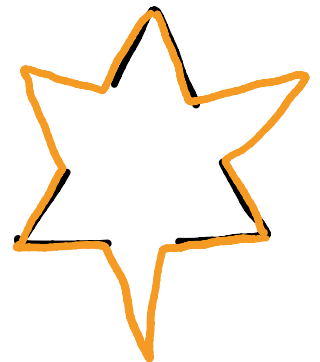
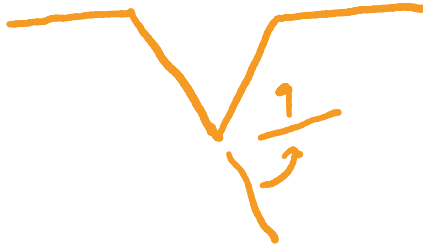
'F++F++F'



initial
shape

Find:

replace
with:

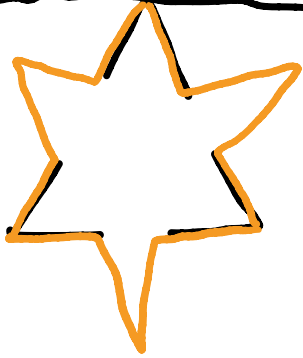


Shape with
replacement rule
applied

Iteration 0: 'F++F++F'] base string

Iteration 1:

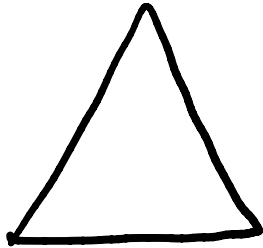
'F-F++F-F' ++ 'F-F++F-F' ++ 'F-F++F-F'



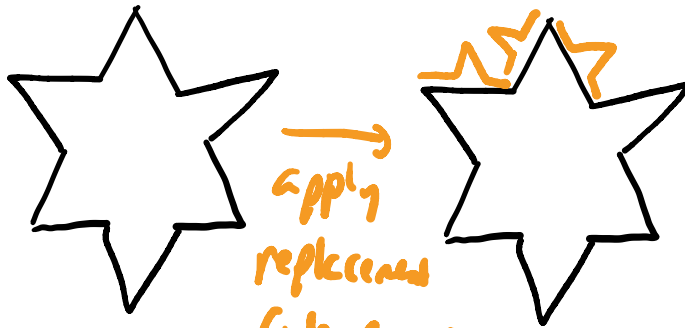
Draws
Star

Pictures

Iteration 0:

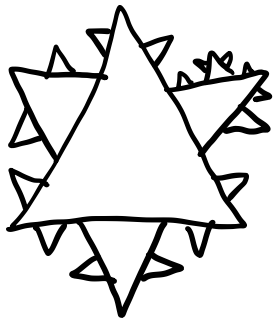


Iteration 1:



apply
replacement
rule again

Iteration 2:



...