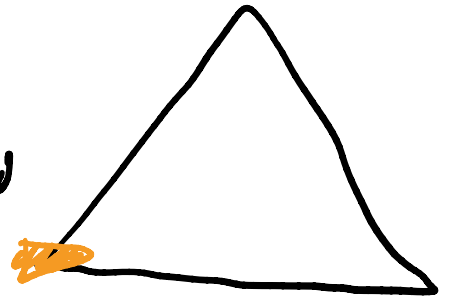


Lecture 28: L-systems

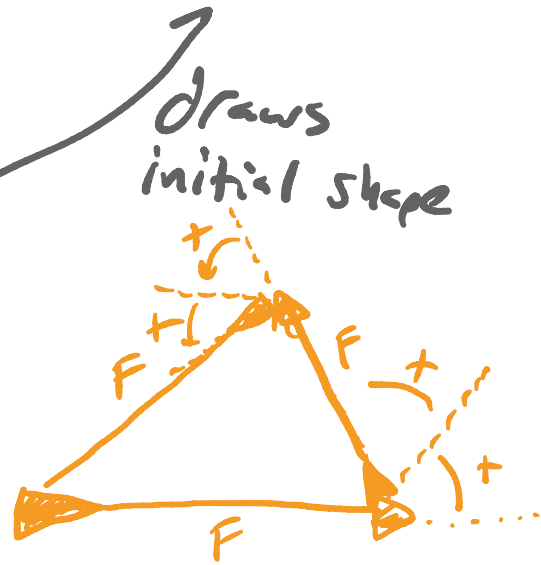
Koch Snowflake

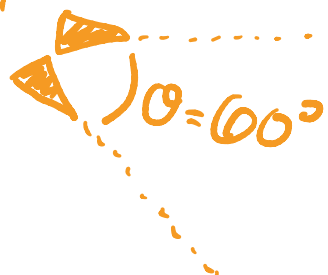
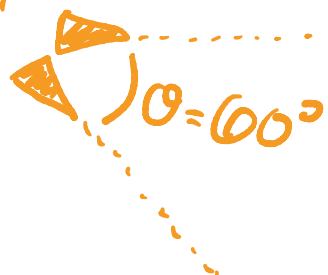
- Start with **Initial Shape** in mind that turtle will draw:



- 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 } different for different L-systems
- θ Should be 60° }
for Koch Snowflake

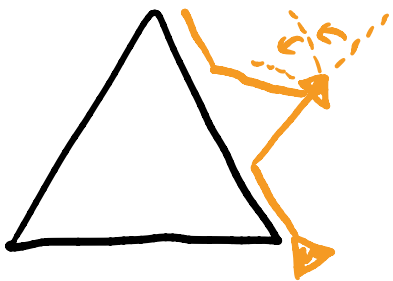
We apply replacement rules some number of times to make the snowflake fractal

Replacement rule composed of:

1) Find string — e.g. 'F' } every time we see this
↓ replace with this

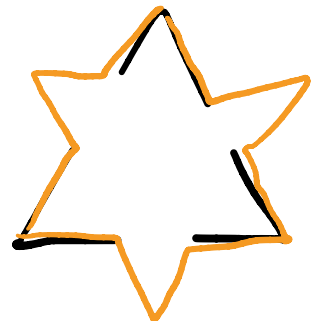
2) Replace string — e.g. 'F - F ++ F - F'

'F ++ F ++ F'



initial
shape

Find: —————
replace
with: ————▲—————



Shape with
replacement rule
applied

Iteration 0: $F \quad ++ \quad F \quad ++ \quad F$] base string

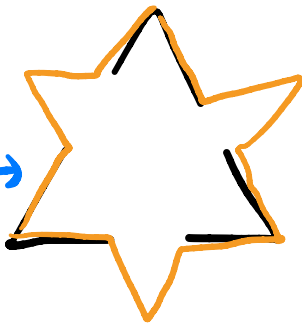
Iteration 1:

$F-F++F-F \quad ++ \quad F-F++F-F \quad ++ \quad F-F++F-F$

this string

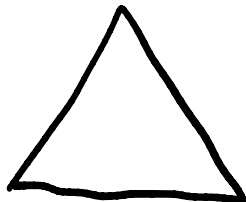
draws

this →

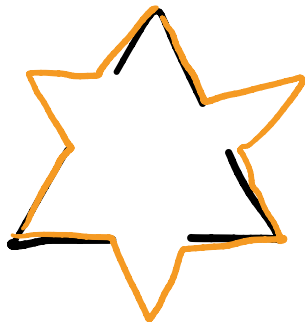


Pictures

Iteration 0:



Iteration 1:



$F \rightarrow F-F++F-F$

Iteration 2:

