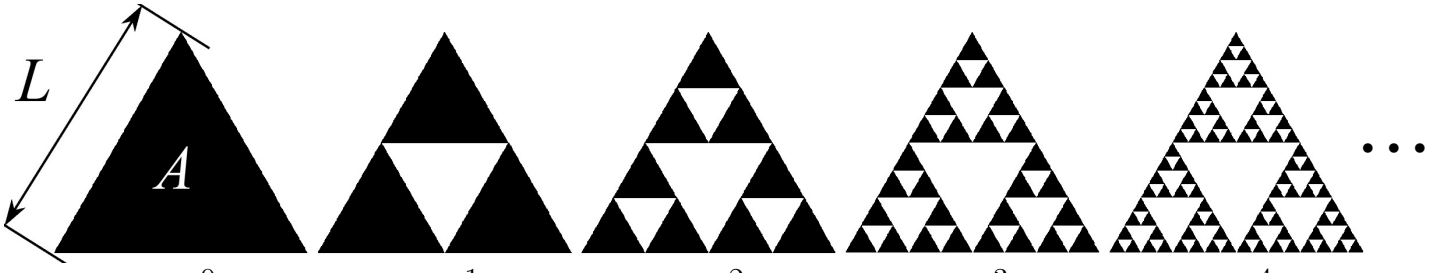
ACTIVITY#09 — Math 151 — Calculus II — Spring 2021

Professor/TA: _____ **Sec/Time:** _____ **RedID:** _____

NAME (printed): _____ _____ **Partners:** _____
(Family Name) **(First Name)**

FRACTALS: Let us discover some striking properties of self-repeating images called fractals by using sequences. In particular, focus on the SIERPINSKI TRIANGLE that is constructed by removing the "middle" triangle at each iteration (as shown in the figure below) and performing this process *ad infinitum*.

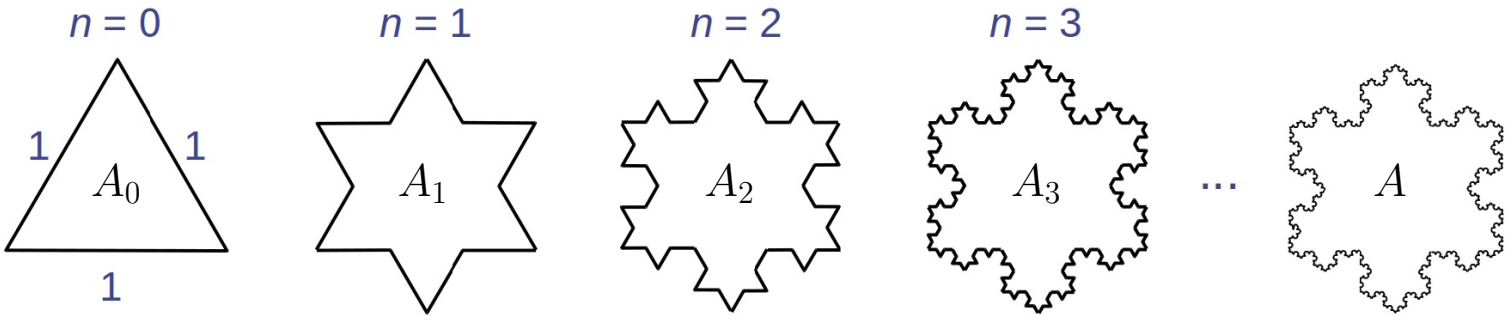


(1) Before doing any computations, predict what is the area and perimeter of the Sierpinski triangle. Explain your reasoning!!!

(2) Compute the **AREA** of the Sierpinski triangle. For the sake of simplicity assume that the initial area is A.

(3) Compute the **PERIMETER** of the Sierpinski triangle. Do not forget to include ALL sides, i.e., include the sides of ALL inner triangles. For the sake of simplicity assume that the initial side length is L.

Let us now do something similar with another interesting object: the **Koch snowflake**:
[Note: in your calculations please leave A_0 UNEVALUATED. Just keep the symbol A_0 for simplicity]



(4) Compute the **AREA** inside the Koch snowflake.

(5) Compute the **PERIMETER** of the Koch snowflake.

(6) Wait a second! How can an object with *finite* area have an *infinite* perimeter??? Can you try to explain this weird phenomenon?