1 Code journal: Koch Curve in Python

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1.1 The Koch Curve

The **Koch Curve**, also known as Koch Snowflake or Koch Star, is a **fractal curve** developed my mathematician Helge von Koch as it involves basic elementary geometry concepts for its construction. The algorithm that follows is **recursive**.

It is **recursive** mainly because it is a fractal curve, which means that the overall curve is constructed by smaller-scale of its identical basic figure. In the case of the Koch Curve, the idea is to take a line from point p_0 to p_1, and take into account the number of sides we want (S), in this case S = 3 for a triangle, and do the following: divide the line in S parts where the resulting length will be called a, then after the `int(S/2.0)` part (1 for a triangle), start by putting the S - 1 sides left to form the figure desired, and repeat this **for every edge (line)** that the overall curve has, until the total number of iterations (N) is completed. During each iteration, the length of the regular polygon's sides (in this case an equilateral triangle) will always be current a value. For a curve that starts as an equilateral triangle (iteration 0), the first, second and third iterations would look as below.

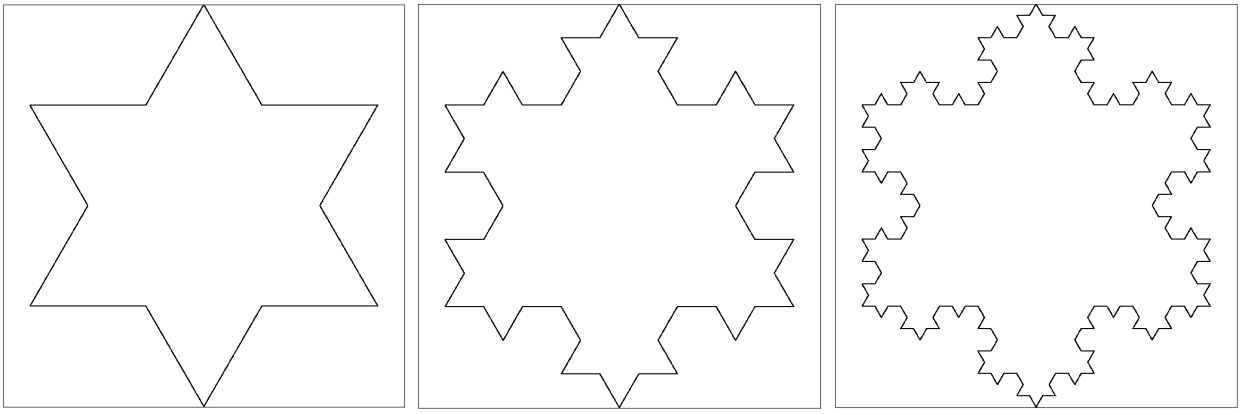

Figure 1: Koch Curve until 3 iterations

1.2 Building An Algorithm

The process described above needs to use to mathematical concepts: **vectors** and **rotation matrices** for two dimensions, since we want to paint it over a 2D image.

First thing is to calculate the vector from p_0 to p_1 and call it $\boldsymbol{v}$,

$$\boldsymbol{v} = \langle x_1 - x_0,\, y_1 - y_0 \rangle \tag{1}$$