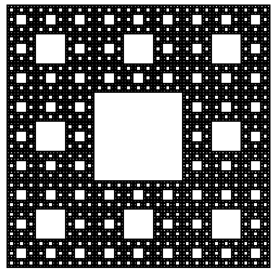

FIGURE 1. A picture of the Sierpinski carpet.

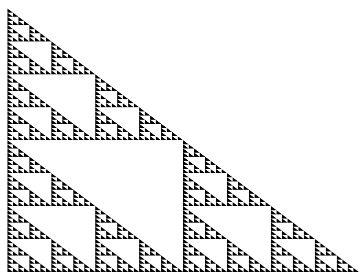

FIGURE 2. A Sierpinski gasket.

Math 311: Section 3.

Workshop 5: Sets gone wild.

Problem 5.1. See Figure 1 for a picture of the Sierpinski carpet.

Notice that the central square has sidelength exactly one-third of the total figure. Using the algorithms of Section 3.1 in the book determine the area of the carpet. Determine the dimension. If the sidelength is one and the lower left hand corner is at the origin of the xy plane, then what is the intersection of the carpet with the line $y = 1/2$? How does the intersection vary as you vary the choice of horizontal line?

Problem 5.2. See Figure 2 for a picture of the Sierpinski gasket.

As above, determine the area of the gasket. Does the ratio of the triangle (it has side lengths of 3, 4, and 5 units) matter? Does it effect the dimension of the gasket? How does the gasket intersect vertical lines?

Problem 5.3. See Figure 3 for a picture of one-third of the Koch snowflake.

The top of the snowflake is built as follows: take an edge of length 1, remove the middle third, and add two edges of length $1/3$ forming the top of an equilateral triangle. Now repeat this process at ever smaller scales.

What is the length of the snowflake? What is its dimension? How does the snowflake intersect its horizontal base?

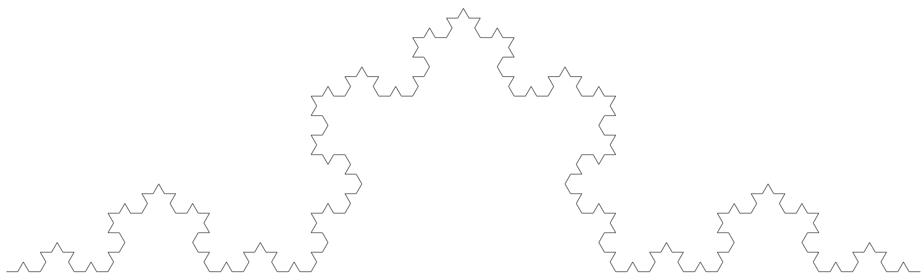

FIGURE 3. A picture of the Koch snowflake.