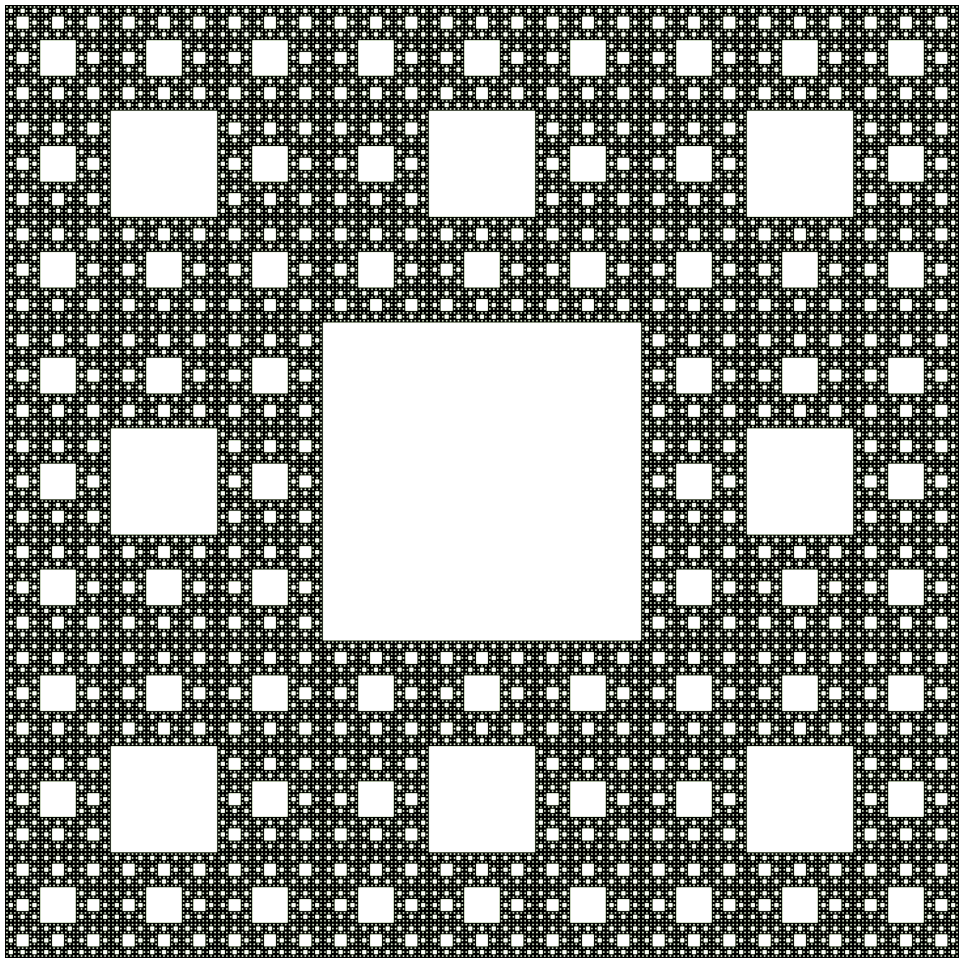
1. **The Sierpinski Carpet, revisited:** In PS 10, you worked with the Sierpinski Carpet. Remember: because it's easier to do by hand, what I asked you to find was actually the *negative* Sierpinski Carpet (as in film negative) – in the true Sierpinski Carpet, what you colored in as black would be empty/white, and what you left empty/white would be colored in as black. Below is the result of the first six or so steps of the true Sierpinski Carpet.

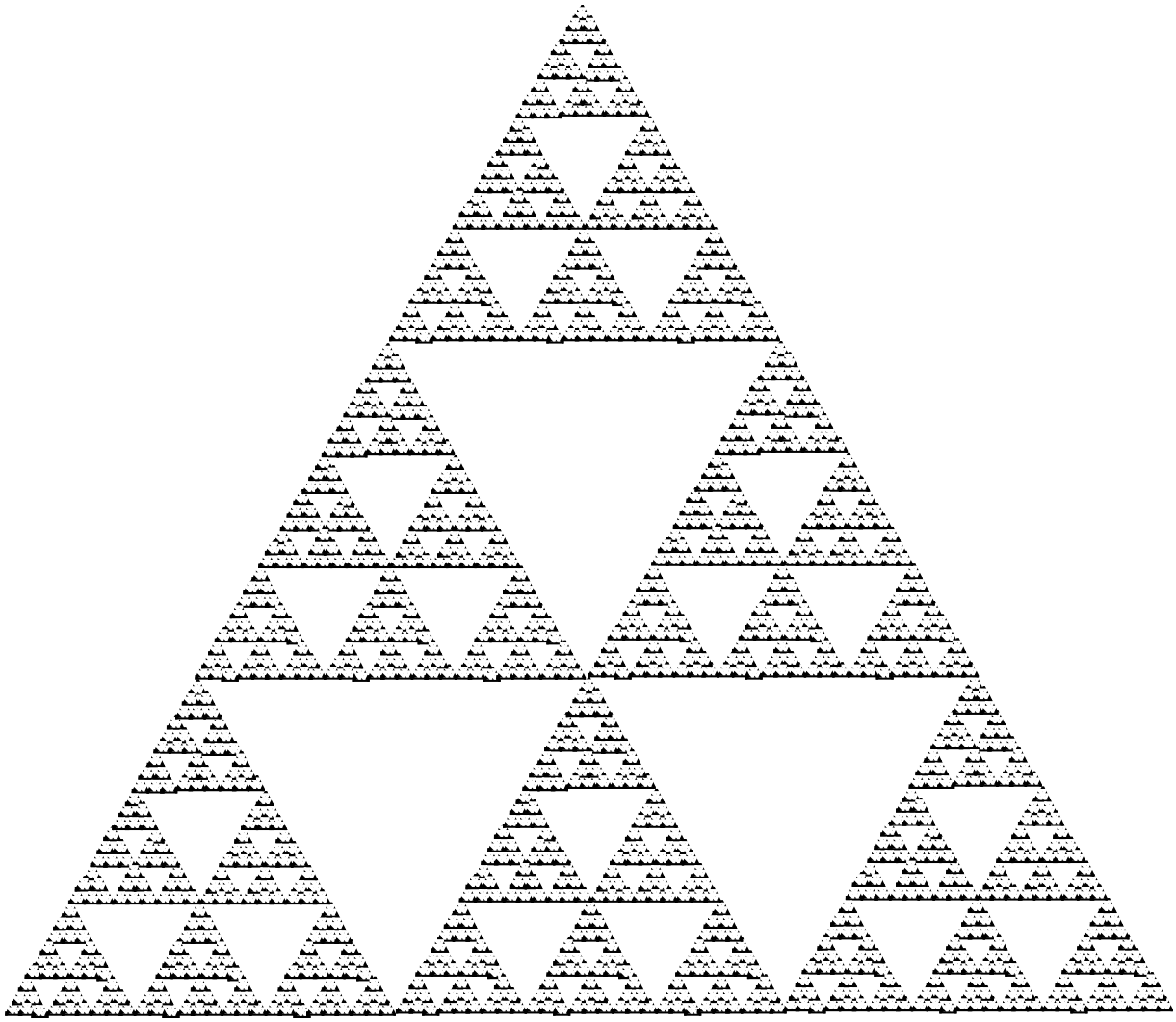
   Find its similarity dimension.



   (In case it helps, the recursive process for creating the true Sierpinski Carpet is: Start with a solid black square. Whenever and wherever you see a solid black square, divide it into ninths and remove the center square.)

2. **The Mitsubishi Gasket, revisited:** In PS 10, you also worked with the Mitsubishi Gasket (and once again, you created the negative version). Below is the result of the first several steps of the true Mitsubishi Gasket.

   Find its similarity dimension.



   (In case it helps, the recursive process for creating the true Mitsubishi Gasket is: Start with a solid black equilateral triangle. Whenever and wherever you see a solid black triangle, divide it into nine equal subtriangles, and remove the middle (upside down) three.)

3. What points in the plane do the following complex numbers represent? Graph (and label) all of them on a well-labeled single set of axis (preferably on graph paper).

   (a) $2 - 3i$

   (b) $3 + 4i$

   (c) 7

   (d) $-2i$

4. Evaluate the following: (Remember that $i = \sqrt{-1}$.)

   (a) $(-7 + i) - (1 + 6i)$

   (b) $(3 - i)(5 + 2i)$

   (c) $i(4 + 3i)$

   (d) $(-2 + 4i)(8 - i)$

   (e) $(-1 + i)^2$

   (f) $\left(\frac{1}{2} - \frac{2}{3}i\right)^2 + (2 - 3i)$

5. For each of the following seeds s,

   (i) Find the first 5 terms of the Mandelbrot sequence with seed s. (Recall: The Mandelbot sequence is just the list of results you get when you've started with a seed.)

   (ii) Is this Mandelbrot sequence *escaping, periodic,* or *attracted*?

   (iii) Is the point in the plane identified with the seed in the Mandelbrot set?

   (iv) Will the point in the plane identified with the seed be a black point, or a non-black point?

   (a) $s = 2.$

   (b) $s = -.25$

   (c) $s = -i$

   (d) $s = 1 + i$