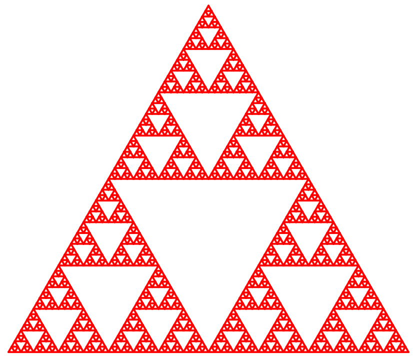

Figure 38.1: The Sierpinski gasket

We wrote a *Mathematica* program that iterates any finite number of affine maps on any input figure consisting of combinations of points, line segments, and polygons (with their interior points). Starting with the edges of the triangle a, b, c, after 6 iterations, we get the picture shown in Figure 38.1.

It is amusing that the same fractal is obtained no matter what the initial nonempty compact figure is. It is interesting to see what happens if we start with a solid triangle (with its interior points). The result after 6 iterations is shown in Figure 38.2. The convergence towards the Sierpinski gasket is very fast. Incidently, there are many other ways of defining the Sierpinski gasket.

A nice variation on the theme of the Sierpinski gasket is the *Sierpinski dragon*.

Example 38.2. The Sierpinski dragon is specified by the following three contractions:

$$\begin{aligned} x' &= -\frac{1}{4}x - \frac{\sqrt{3}}{4}y + \frac{3}{4}, \\ y' &= \frac{\sqrt{3}}{4}x - \frac{1}{4}y + \frac{\sqrt{3}}{4}, \end{aligned}$$

$$\begin{aligned} x' &= -\frac{1}{4}x + \frac{\sqrt{3}}{4}y - \frac{3}{4}, \\ y' &= -\frac{\sqrt{3}}{4}x - \frac{1}{4}y + \frac{\sqrt{3}}{4}, \end{aligned}$$

$$\begin{aligned} x' &= \frac{1}{2}x, \\ y' &= \frac{1}{2}y + \frac{\sqrt{3}}{2}. \end{aligned}$$