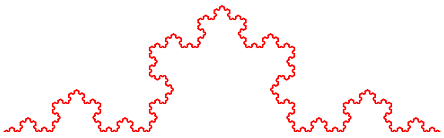

Figure 38.5: The Koch curve

Example 38.4. The Koch curve is specified by the following four contractions:

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

$$\begin{aligned} x' &= \frac{1}{6}x - \frac{\sqrt{3}}{6}y - \frac{1}{6}, \\ y' &= \frac{\sqrt{3}}{6}x + \frac{1}{6}y + \frac{\sqrt{3}}{6}, \end{aligned}$$

$$\begin{aligned} x' &= \frac{1}{6}x + \frac{\sqrt{3}}{6}y + \frac{1}{6}, \\ y' &= -\frac{\sqrt{3}}{6}x + \frac{1}{6}y + \frac{\sqrt{3}}{6}, \end{aligned}$$

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

The Koch curve is an example of a continuous curve which is nowhere differentiable (because it "wiggles" too much). It is a curve of infinite length. The result of 6 iterations, starting with the line segment $((-1,0),(1,0))$, is shown in Figure 38.5.

The curve obtained by putting three Kock curves together on the sides of an equilateral triangle is known as the *snowflake curve* (for obvious reasons, see below!).