

Chapter 16: Exercises with Fractals and Dimension

Worksheet to accompany

David Feldman, *Chaos and Fractals: An Elementary Introduction*,
Oxford University Press, 2012

1. The Sierpiński Triangle

- (a) Draw a large Sierpiński triangle. Do so by starting with a large triangle and then removing triangles.
- (b) Complete the following table using the successive steps for your Sierpiński construction:

| Step | Number of Triangles | Area of Each Triangle | Total Area |
|------|---------------------|-----------------------|------------|
| 0 | | | |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| n | | | |

- (c) As n goes to infinity, what happens to the total area of the Sierpiński triangle?

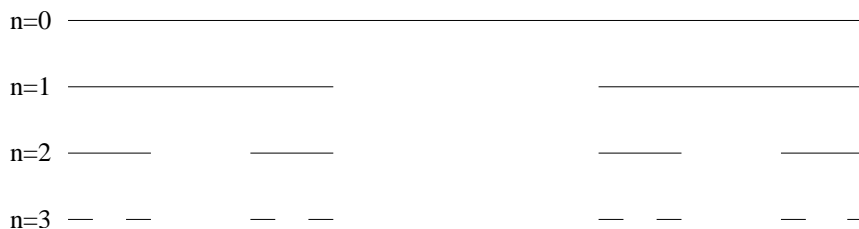


Figure 1: Steps in the construction of the Cantor Set.

2. The Cantor Set

- (a) Complete the following table using the successive steps in the construction of the Middle-Thirds Cantor Set, as illustrated in Fig. 1:

| Step | Number of Segments | Length of Each Segment | Total Length |
|------|--------------------|------------------------|--------------|
| 0 | | | |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| n | | | |

- (b) As n goes to infinity, what happens to the total length of the Cantor Set?
- (c) What is the dimension of the Cantor Set?