# TFY4305 solutions exercise set 22 2014

## Problem 11.3.2

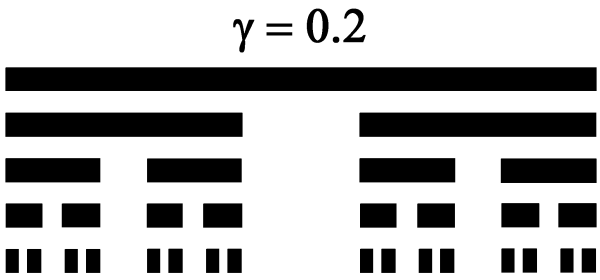


Figure 1: A generalized Cantor set with $\gamma = a = 0.2$.

If we scale the original segment by a factor of $(1/2 - \gamma/2)$, we need two segments to cover the next iterate. Thus the fractal dimension is

$$d = \frac{\ln 2}{\ln\left[2/(1-\gamma)\right]}$$

## Problem 11.3.8

a) See Fig. 2 below.

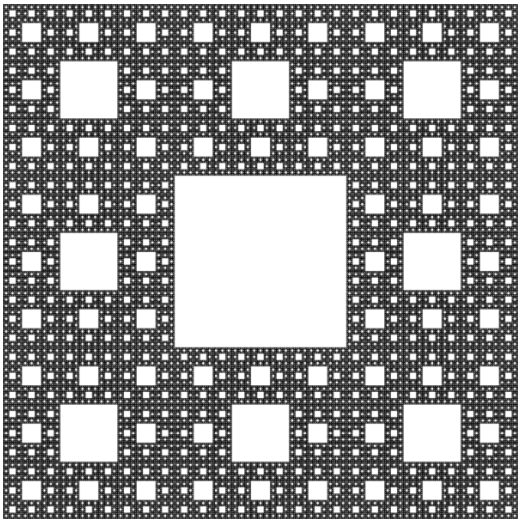

Figure 2: The Sierpinski carpet.

b) If we scale by a factor of three, we get eight copies of the original figure. Thus $r = 3$ and $m = 8$ and

$$d = \underline{\underline{\frac{\ln 8}{\ln 3}}} . \tag{1}$$

c) At every stage, we remove 1/9 of the area, i.e. $A(S_n) = \frac{8}{9} A(S_{n-1})$. Thus

$$A(S_n) = A(S_0) \left(\frac{8}{9}\right)^n . \tag{2}$$

Taking the limit $n \to \infty$, we obtain $\underline{\underline{A(S_\infty) = 0}}$.