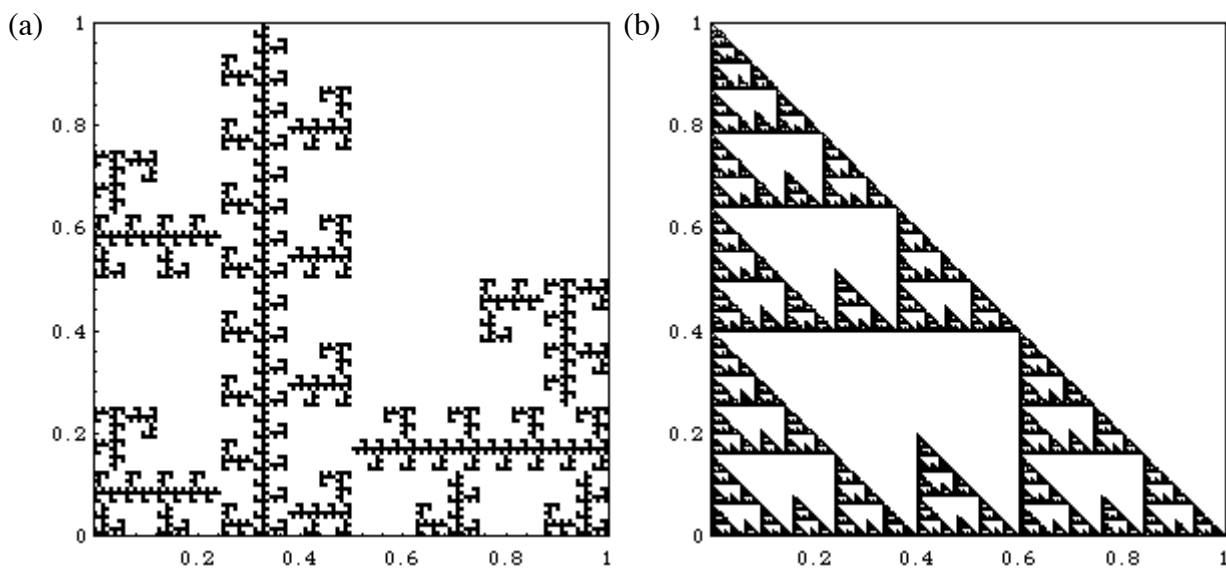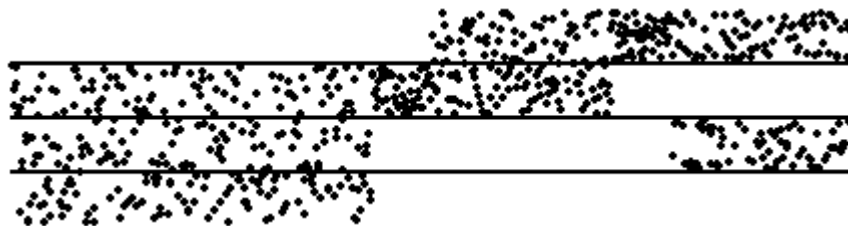# Practice Exam 1

1. Find IFS rules to generate these fractals.

(a)

(b)

2. Find the similarity dimensions of the fractals (a) and (b) of problem 1. If you use the Moran equation, solve it exactly, or explain why it cannot be solved exaclty.

3. Consider the time series shown below, with the bin boundaries given by the horizontal lines.

Sketch the resulting driven IFS. Explain how you arrived at your sketch.
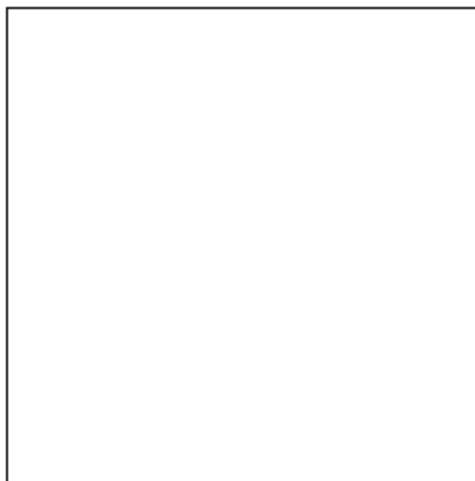
4. Recall we represent allowed pairs in a driven IFS by a table, with shaded boxes indicating the allowed pairs. For example, the table
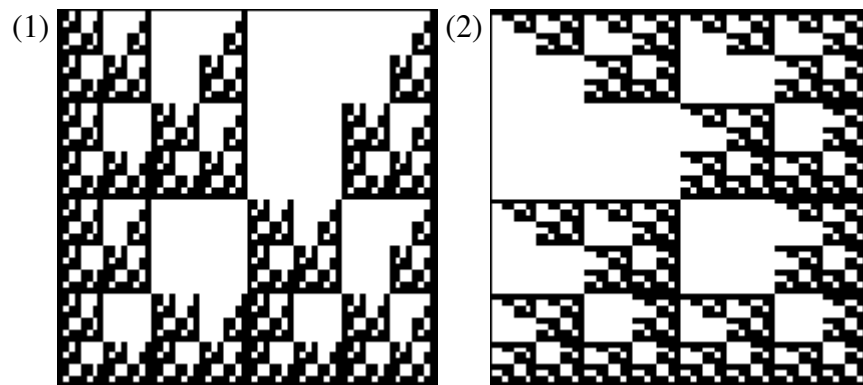

indicates all pairs are allowed, except that T_4 cannot follow T_1.

Which of these tables

corresponds to the driven IFS generating each of these images? Give a reason supporting your answer.

5. (a) Show that for A, B, and C in n-dimensional space, $\dim(A \cap B \cap C) = \dim(A) + \dim(B) + \dim(C) - 2n$.

(b) Compute the intersection of three gaskets in 2-dimensional space.

(c) Compute the intersection of three gaskets in 3-dimensional space.

6. Suppose a fractal in the plane is made of four pieces, each scaled by a factor of r. If r > 1/2, show the similarity dimension formula gives d > 2. Yet we know any subset of the plane has d <= 2. Reconcile these two contradictory observations. For simplicity, you may assume the fractal has four corners, and those coincide with the corners of the unit square.