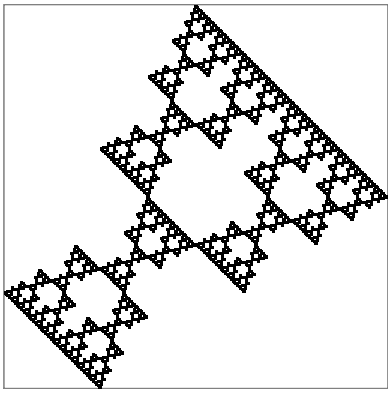
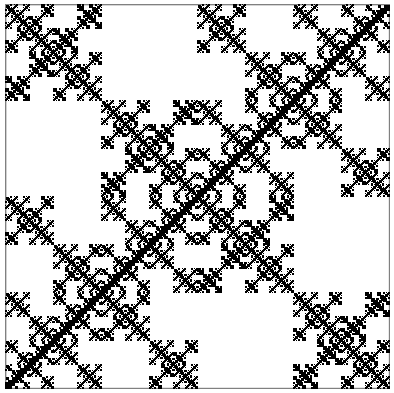
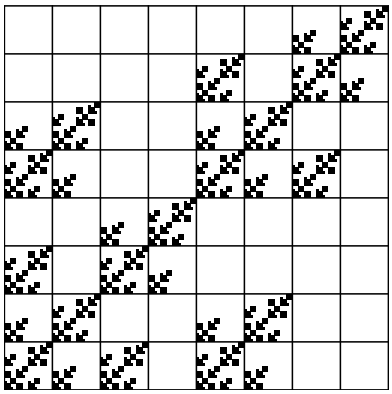
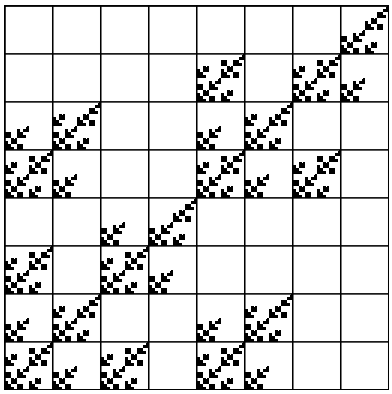
Practice Exam 6

1. Find the IFS rules to generate these fractals. For reference, the unit square is drawn in grey around each fractal.

(a)  (b) 

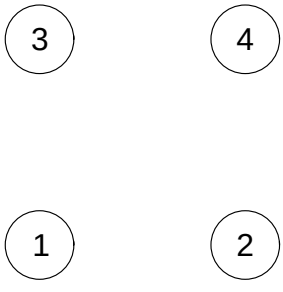
2. Find the similarity dimensions of the fractals (a) and (b) above. If the Moran equation is used, solve it exactly using the quadratic formula.

3. (a) Pictured below are two IFS with memory images. Determine if either can be generated by forbidden pairs. Explain how you arrived at your answer. Give explicit details. For reference, the length three address squares are shown on both images.

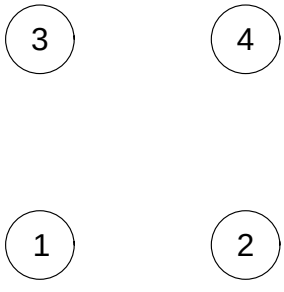
(i)  (ii) 

(b) For each image that is generated by forbidden pairs, fill in the appropriate arrows on the corresponding graph.

(i)



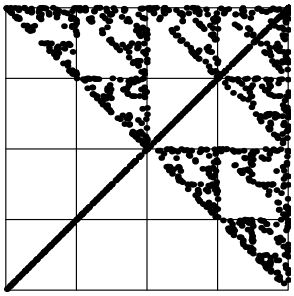
(ii)

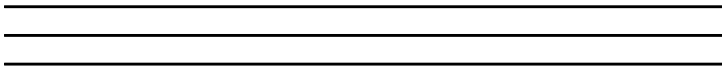


(c) If either of these can be generated by forbidden pairs, can it also be generated by an IFS without memory? Give a reason to support your answer, and give the IFS without memory, if there is one.

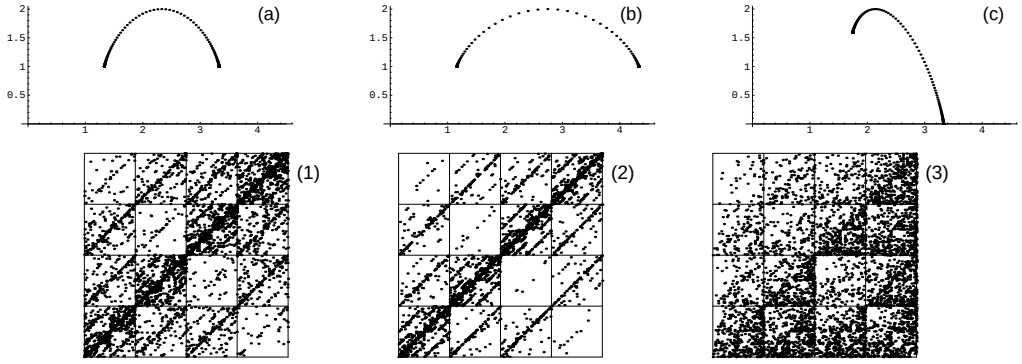
4. Pictured below is a driven IFS image. Using the bin boundaries indicated, sketch a time series that could generate the driven IFS. Explain what features of the driven IFS guided

your construction of the time series. Provide enough detail in the time series to illustrate your explanation.





5. The top three figures are $f(\alpha)$ curves, each generated by one of the driven IFS in the bottom three pictures. Say which IFS generates which $f(\alpha)$ curve. Explain each of your choices. Do not use the process of elimination



6. Suppose A is a Cantor set with dimension $d = \log(2)/\log(3)$, and B is a Cantor set consisting of $N = 2$ pieces, each scaled by a factor of r. Find a formula for the value of r giving $d(A \times B) = 1$. Your answer should contain logarithms. Show how you arrived at your answer.