Fractals and Scaling (Fall, 2015)

3.7 Test » Test for Unit 3

Instructions 1

You may use any course materials, websites, calculators, etc. for this test. Just don't ask another person for the answers or share yo with other people. If you have questions about the test, please send them to us via email.

Question 2

It takes 350 boxes of side s=1/2 to cover a certain circle. Approximately how many boxes of side s=1/4 would be needed to cover the c

- A. 350
- B. 700
- C. 990
- D. 1400

Question 3

A fractal with a dimension of D=1.5 is covered by 124 boxes of side s=1/8. How many boxes of side s=1/16 would be needed to cover t

- A. 124
- B. 248
- C. 351
- D. 496

Question 4

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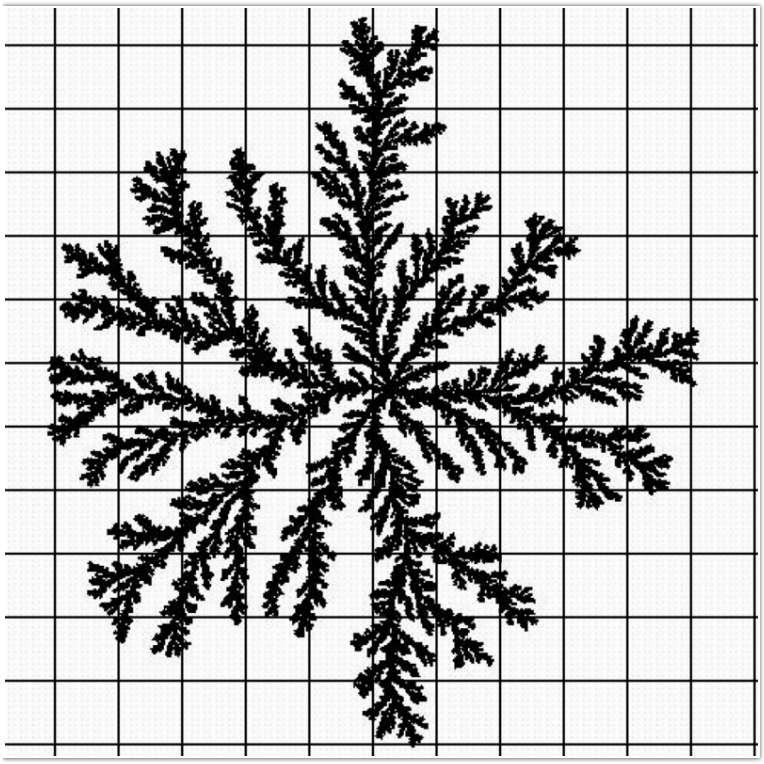


(DLA figure from http://people.umass.edu/machta/images/dla.html.)

Shown in the figure above is a shape generated by diffusion limited aggregation. On top of this shape is a grid of boxes with side s = 1 number of such boxes needed to cover this shape is closest to:

- A. 54
- B. 87
- C. 113
- D. 140

Question 5

It takes 100 boxes of side 1/2 and 300 boxes of side 1/4 to cover a certain object. What is the box-counting dimension of this object?

- A. 1.36
- B. 1.50
- C. 1.58
- D. 1.70

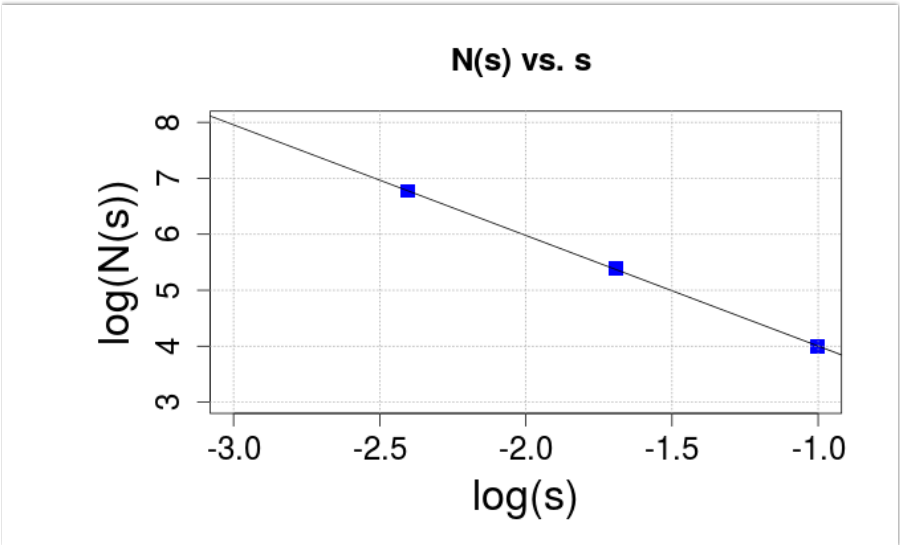
Question 6

Suppose one does box-counting for an object using boxes of several sides s, recording the number of boxes N(s) needed to cover the then makes a plot of log(s) vs. log(N(s)). If this plot is **not** a straight line, what could this mean?

- A. The box size s is not sufficiently small
- B. The object is not a fractal
- C. Both A and B

Question 7

Suppose one does box-counting for an object and obtains the plot of log(s) vs. log(N(s)) shown below. What is the approximate box-c dimension of the object?



- A. 1.25
- B. 1.50
- C. 1.75
- D. 2.0