Fractals and Scaling (2020)

1.7 Test » Test for Unit 1

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 your with other people. If you have questions about the test, please send them to us via email.

Question 2

The first several steps in the construction of the Cantor set are shown above. At step n=4, how many line segments are there?

- A. 8
- B. 10
- C. 12
- D. 16

Question 3

Referring again to the construction of the Cantor set, shown above in Question1, what is the total length of all line segments at step n=4 that at step n=0 the line has a length of 1.

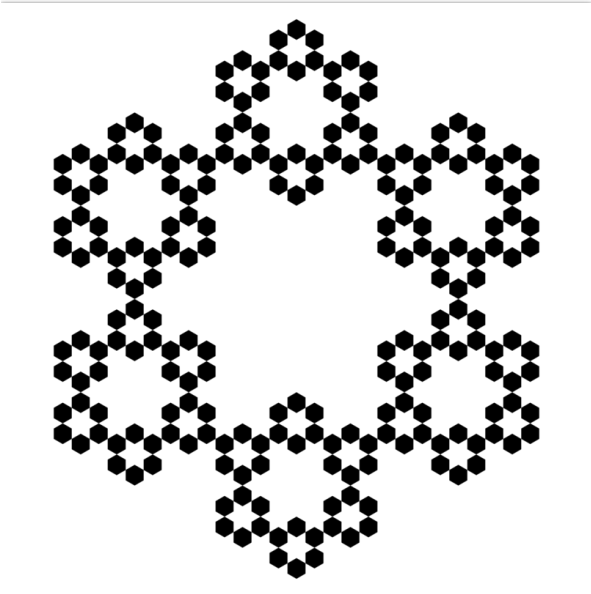
- A. 4/3
- B. 16/3
- C. 16/27
- D. 16/81

Question 4

What is the self-similarity dimension of the Cantor set?

- A. log(2)/log(3)
- B. log(3)/log(4)
- C. log(3)/log(5)
- D. log(3)/log(6)

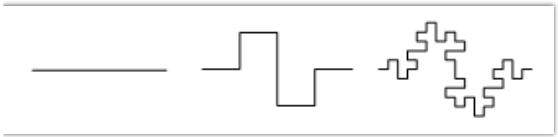
Question 5



What is the self-similarity dimension of the shape shown above?

- A. log(3)/log(2)
- B. log(5)/log(3)
- C. log(6)/log(3)
- D. log(7)/log(3)

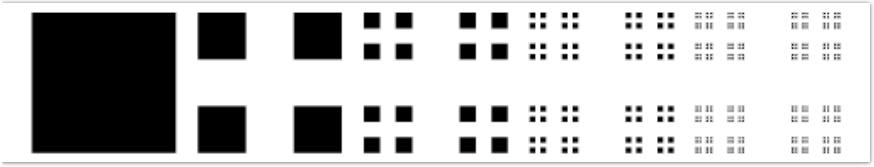
Question 6



The first several steps in the construction of a fractal are shown above. (This is another variation on the Koch curve.) What is the self-
dimension of this fractal? (Figure from http://robertdickau.com/kochsurface.html.)

- A. log(4)/log(3)
- B. log(8)/log(2)
- C. log(8)/log(3)
- D. log(8)/log(4)

Question 7



Shown are the first several stages in the construction of a fractal. What is its self-similarity dimension? (Figure source: http://mathworld.wolfram.com/CantorDust.html.)

- A. log(4)/log(3)
- B. log(5)/log(3)
- C. log(4)/log(2)
- D. log(8)/log(3)

Question 8

If you take a watermelon and scale it up by a factor of 3, what happens to its volume? (Assume that the watermelon is three-dimensiona

- A. Its volume is 3 times larger.
- B. Its volume is 9 times larger.
- C. Its volume is 18 times larger.
- D. Its volume is 27 times larger.

Question 9

Cauliflower has a dimension of around 2.8. If you took a cauliflower and scaled it up by a factor of 2, what happens to its volume?

- A. Its volume is around 4 times larger.
- B. Its volume is around 6.96 times larger
- C. Its volume is around 7.84 times larger
- D. Its volume is around 8 times larger