Lecture 10: Quiz

Name:

Problem 1
What is the dimension of the Cantor middle set?
 a) 2/3  b) log(2/3)  c) log(2)/log(3)  d) log(3)/log(2).

Problem 2
What is a fractal?
 a) A set of fractions.
b) A geometric fractured into several pieces.
c) A set with non-integer dimension.
d) A set with cardinality between the integers and reals.

Problem 3
Assume we can cover a set X with n boxes of size r. The dimension is the limit:
 a) \(-\log(n)/\log(r)\)
b) \(\log(n)/\log(r)\)
c) \(\log(r)/\log(n)\)
d) \(-\log(r)/\log(n)\)

Problem 4
How are Julia sets defined?
 a) Starting points z for which iterates of \(f_c(z) = z^2 + c\) stays bounded.
b) The boundary of the setarting points for which iterates of \(f_c(z) = z^2 + c\) stays bounded.
c) The set of c for which the orbit of \(f_c(z) = z^2 + c\) starting with z = 0 stays bounded.
d) The set of c for which the orbit of \(f_c(z) = z^2 + c\) starting with \(z = c\) stays bounded.

Problem 5
Which mathematician has first described the middle third Cantor set?
a) Smith  b) Cantor  c) Weierstrass  d) Mandelbrot

Problem 6
Which fractal is displayed in the picture?
a) The Barnsley fern  b) The tree of Pythagoras  c) The Douady rabbit  d) Sierpinsky carpet

Problem 7
What is the Mandelbrot set?
a) The set of z for which the orbit of \(T(z) = z^2 + c\) diverges.
b) The set of c for which the orbit of \(T(z) = z^2 + c\) starting with z = 0 diverges.
c) The set of z for which the orbit of \(T(z) = z^2 + c\) stays bounded.
d) The set of c for which the orbit of \(T(z) = z^2 + c\) starting with z = 0 stays bounded.

Problem 8
Which of the following sets are fractals?

Problem 9
Which of the following sets are fractals?

Problem 10
If we multiply the complex numbers 1 + 3i with 3 + 4i, we get
 a) 3 + 8i  b) 11 + 10i  c) -5 + 10i  d) -9 + 13i.