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) $-\log(r)/\log(n)$

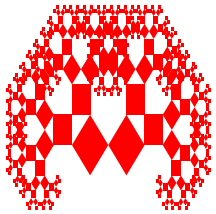
Problem 4

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 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 is the higher dimensional analog of the mandelbrot set?
a) The Menger Sponge.
b) The Mandelbrot bulb
c) The Shirpinski Tetrahedron
d) The Quaternionic Julia set

Problem 8

Which of the following sets are fractals?
a) The Menger sponge.
b) The Barnsley fern
c) The line.
d) The Koch curve.
e) The Cantor middle third set.

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) $-9 + 13i$.