Lecture 10: Quiz

Name: 

Problem 1

Who wrote the article "How long is the coast of Britain?"
   a) Barnsley   b) Newton   c) Mandelbrot   d) Sierpinski

Problem 2

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 3

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

Problem 3

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

Problem 4

How are Julia sets defined?
   a) The set of $c$ for which the orbit of $f_c(z) = z^2 + c$ starting with $z = c$ stays bounded.   b) Starting points $z$ for which iterates of $f_c(z) = z^2 + c$ stays bounded.
   c) The boundary of the starting points for which iterates of $f_c(z) = z^2 + c$ stays bounded.
   d) The set of $c$ for which the orbit of $f_c(z) = z^2 + c$ starting with 0 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 cauliflower   b) The sphere of Pythagoras
   c) The mandelbulb   d) Sierpinski bulb

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 $z$ for which the orbit of $T(z) = z^2 + c$ stays bounded.
   c) The set of $c$ for which the orbit of $T(z) = z^2 + c$ starting with $z = 0$ diverges.
   d) The set of $c$ for which the orbit of $T(z) = z^2 + c$ starting with $z = 0$ stays bounded.

Problem 8

The higher dimensional analog of the Mandelbrot set is also of the form $T(z) = z^8 + c$. What is multiplied by a factor 8? a) The Euler Angles.   b) The radius   c) The area.   d) The volume

Problem 9

Which of the following sets are fractals?
   a) The Menger sponge.   b) The sphere
   c) The graph of $y = x^2 + 1$.   d) The Koch curve.
   e) The Cantor middle third set.

Problem 10

If we multiply the complex numbers $2 + i$ with $2 + 3i$, we get
   a) $1 + 8i$   b) $7 + 8i$   c) $4 - 2i$   d) $4 + 2i$. 