Homework 4: Chapter 7 and "The Calculus of Intricacy" article

DUE: Wednesday, October 27, start of class.

1. In the article "The Calculus of Intricacy", the author Seth Lloyd says "Complexity is not to be equated with information content alone." Write a couple of sentences explaining his reason(s) for saying this.

2. In a paragraph or so, explain the main idea of "algorithmic information content" and name two disadvantages of this measure discussed by Lloyd in "The Calculus of Intricacy".

3. In a paragraph or so, explain the main idea of "logical depth". How is it distinguished from algorithmic information content? Name two disadvantages of this measure discussed by Lloyd in "The Calculus of Intricacy".

4. In a paragraph or so, explain the main idea of Lloyd and Pagel's "thermodynamic depth". Describe how it might be used to compare the complexity of a sand castle and a sand dune, and why one would be considered more complex than the other.

5. Come up with your own list of two advantages and two disadvantages of thermodynamic depth as a measure of complexity.

6. Calculate the fractal dimension of the Sierpinski triangle (shown in class). Show your work.

7. Using the alphabet F, f, +, - (as described in class), give an L-system that generates the Cantor set formed by removing the middle half (rather than middle third). Demonstrate via a picture that the L-System you devised works.

8. Compare the Koch curve and the Cantor middle-thirds set by (1) length of L-system grammar; (2) fractal dimension; (3) your own subjective perception of their complexity. Which of (1) and (2) best approximates (3), and why?