

CS 346U
Exploring Complexity in Science and Technology
Fall, 2009

Week 4 Reading Questions (Chapter 7 and “The Calculus of Intricacy” article)

Due Wednesday, October 28.

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 paragraph explaining his reason(s) for saying this.
2. In one or two paragraphs, 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 one or two paragraphs, 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 one or two paragraphs, 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. 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?