

EECS 217C Nanotechnology

Homework #1

Due Monday, April 12, 2004, at the beginning of class

- 1) Using Moore's law, and available empirical data from Moore's most recent ISSCC presentation, calculate the year in which the size of a transistor will be the size of a single atom. Do you expect this to occur in your lifetime?
- 2) Compare the number of bits that are contained in a single human cell in the form of DNA to the amount of memory in your home computer. Which has more information storage capacity, a single cell or your home computer? Which has more information density?
- 3) Estimate the gate capacitance of a modern transistor. Now, calculate how much energy it costs to add one electron to the gate (e^2/C). Is this energy larger or smaller than a typical thermal energy ($k_B T$)?