Material for Week 1

Physics 4488/6562: Statistical Mechanics

http://www.physics.cornell.edu/sethna/teaching/562/

Exercises due Mon. Jan 27

Last correction at March 12, 2020, 4:48 pm

Before class, read the assigned material. Pre-class questions are due 8:00am on the morning before class on days when homeworks are not due (usually Wednesdays and Fridays), and otherwise should be turned in with the homeworks. Emergent vs. fundamental, is due *tomorrow evening.* If you are not registered for the class, sign up on the sheet today, and we'll add you to the Canvas site tonight.

All exercises are from Version 2.0 of the text: http://pages.physics.cornell.edu/∼sethna/StatMech/v2EntropyOrderParametersComplexity.pdf. See the handout on grading to set up Python 3.0, if needed.

Wednesday

In-class question: 1.4 *Stirling's formula*

In-class question: 1.3 *Waiting time paradox*

Friday

Read: Chapter 1, What is Statistical Mechanics?

Pre-class question: 1.11 *Emergent vs. fundamental*

In-class question: 1.1 *Quantum dice and coins*

Monday

Read: Chapter 2, Sec. 2.1 (Random walk universality), Sec. 2.2 (Diffusion eqn)

Pre-class question: 2.1 *Random walks in grade space*

Exercises

Everyone (4488 and 6562)

1.5 *Stirling and asymptotic series.*
Do the lowest couple of orders in part (d) by hand. If you want to go to high orders, use the hints file (available for Mathematica and Python).

1.13 *The birthday problem.* A classic exercise illustrating a law emerging at large numbers of classmates.

Graduate (6562 only)

1.6 *Random matrix theory.* Hints are available in Python, Mathematica, and Matlab at http://pages.physics.cornell.edu/~sethna/StatMech/ComputerExercises.html.