Material for Week 2
Physics 4488/6562: Statistical Mechanics
https://sethna.lassp.cornell.edu/Teaching/562/
Exercises due Mon. Feb 07
Last correction at January 11, 2022, 9:02 pm

All exercises are from the second edition of the text: https://sethna.lassp.cornell.edu/StatMech/EntropyOrderParametersComplexity20.pdf

Monday
In-class question: 2.15 *Diffusion of nonconserved particles*
In-class question: 2.16 *Density dependent diffusion*
Wednesday
Read: Chapter 2, Sec. 2.4 (Solving: Fourier & Green)
Pre-class question: 2.18 *Absorbing boundary conditions*
In-class question: 2.6 *Fourier and Green*
Friday
Read: Chapter 3, Sec. 3.1 (Microcanonical), 3.2 (Ideal Gas), 3.3 (Temperature) and pressure parts of 3.4 (Pressure & Chemical Potential)
Pre-class question: 3.13 *Weirdness in high dimensions*
In-class question: 3.5 *Hard sphere gas*
Monday
Read: Chapter 3, chemical potential parts of 3.4 (Pressure & Chemical Potential; 3.4.1 is optional) and Sec. 3.5 (Entropy & fussy stuff).
Pre-class question: 3.10 *Triple product relation*

Exercises for everyone (4488 and 6562)

2.5 *Generating random walks.* Hints are available in Python and Mathematica at https://sethna.lassp.cornell.edu/StatMech/EOPCHintsAndMaterials.html

2.11 *Stocks, volatility, and diversification.* Stock prices are pretty well approximated as random walks, but have 'fat tails'. Hints are available in Python and Mathematica at https://sethna.lassp.cornell.edu/StatMech/EOPCHintsAndMaterials.html

Exercises for Graduate Course (6562 only)

2.20 *Flocking.* Animal migration as a random walk in orientation space.

2.19 *Run & tumble.* Here we study the eating strategies of bacteria. When to sit and wait for food to come by? How long to keep swimming, and when to turn?