Material for Week 12
Physics 4488/6562: Statistical Mechanics
https://sethna.lassp.cornell.edu/Teaching/562/
Exercises due Mon. Apr 24
Last correction at December 22, 2022, 2:10 pm

This Wednesday and next Monday we shall be making use of your tablets and laptops to do simulations. Bring them!

The exercises with numbers N1.xxx are to be found in https://sethna.lassp.cornell.edu/StatMech/NewStatMechExercises.pdf

Monday
In-class question: 11.1 *Maxwell and van der Waals*
Wednesday
Read: Chapter 11, Sec. 11.3 (Nucleation: critical droplet theory), and 11.4.1 (Coarsening)
Pre-class question: 11.12 *Nucleation in 2D*
In-class question: 11.6 *Coarsening in the Ising model*
Friday
Read: Chapter 11, Sec. 11.4 (Morphology of abrupt transitions)
Pre-class question: 11.8 *Minimizing sequences and microstructure*
In-class question: 11.7 *Origami microstructure*
Monday
Read: Chapter 12, Introduction
Pre-class question: 12.17 *The Gutenberg–Richter law*

Exercises for everyone

11.13 *Linear stability of a growing interface.* (Surface science) Growing surface steps can make dendrites.

Select one (4488) or two (6562)

11.5 *Nucleation of dislocation pairs.* (Engineering) Dislocation pairs nucleate under stress, causing crystals to flow. How is that different from liquids?
N1.14 *Spinodals vs. Nucleation.* Deep in the coexistence region, water vapor will spontaneously condense without a nucleation barrier.
N1.6 *Beer foam and coarsening.* Von Neumann's theory of 2D bubble coarsening.
11.16 *Mosh pits.* (Active matter) Heavy metal concert audiences naturally coarsen into moshers and drinkers.
N1.8 *Where is the antimatter?* (Astrophysics) Bubble coarsening proposed explanation for matter–antimatter asymmetry in the Universe.
11.14 *Nucleation of cracks.* (Engineering, Condensed matter) Bridges are metastable.
11.15 *Elastic theory does not converge.* (Engineering, Condensed matter) Like QED and Stirling's formula, a nonlinear Hooke's law has zero radius of convergence.