Material for Week 9
Physics 4488/6562: Statistical Mechanics
http://www.physics.cornell.edu/sethna/teaching/562/
Exercises due Mon. Apr 12
Last correction at January 7, 2021, 3:11 pm

- For Wednesday's in-class question 9.10, please print out (or draw) the double-sided projective plane handout from http://pages.physics.cornell.edu/~sethna/StatMech/EOPCHintsAndMaterials.html.
- On Wednesday, have scissors and tape available during class for part (b). (Careful tearing and a stapler might do if necessary.)
- For next Monday's pre-class question 9.2, do parts (a) and (b) only.
- Before next Monday, please print out (or trace) the full-size figures "Nematic S=1/2 defect", "S=-1/2 defect", and "transition path in order parameter space" from the hints Web site for the in-class problem 9.1, "Topological defects in nematic liquid crystals".

Monday
In-class question: 8.19 *2D Ising cluster expansions*
Wednesday
Read: Chapter 9, Sec. (9.1) (Broken symmetry) and (9.2) (Order parameter)
Pre-class question: 9.9 *Ising order parameter*
In-class question: 9.10 *Nematic order parameter*
Friday
Read: Chapter 9, Sec. (9.3) (Examine the elementary excitations)
Pre-class question: 9.15 *Superfluid second sound*
In-class question: 9.6 *Symmetries and wave equations*
Monday
Read: Chapter 9, Sec. (9.4) (Classify the topological defects)
Pre-class question: 9.2 *XY defects*

Exercises for everyone (4488 and 6562)

8.6 *Metropolis.*
8.8 *Wolff.*
8.21 *Fruit flies and Markov.*
Gordon Berman (Cornell PhD) used machine learning to study fly behavior, inspiring this exercise.

Exercises for Graduate Course (6562 only)

8.22 *Metastability and Markov.*
9.5 *Landau theory for the Ising model.*
9.20 *Number and phase in superfluids.*