Material for Week 10
Physics 4488/6562: Statistical Mechanics
https://sethna.lassp.cornell.edu/Teaching/562/
Exercises due Wed. Apr 10
Last correction at November 29, 2023, 9:48 pm

• Chapter 10 is more challenging mathematically than the rest of the course, and the pre-class questions starting next Monday will be more challenging.
• Our in-class exercises on Wednesday will involve computer simulations. They should run on tablets and smart phones as well.
• Pre-class question Friday, only do part (a). We'll do the rest in class.
• The exercises with numbers N1.xxx are to be found in https://sethna.lassp.cornell.edu/StatMech/SethnaExercises.pdf
• This homework is due on Wed. Apr. 12 (due to spring break). Please do the pre-class questions for Monday and Wednesday before class, but turn them in with this problem set.

Monday
In-class question: 9.1 *Nematic defects*
In-class question: 9.11 *Pentagonal order parameter*
In-class question: 9.19 *Defect entanglement*
Wednesday
Read: No reading today
Pre-class question: 9.13 *Chiral wave equation*
In-class question: 9.18 *Defects in crystals*
In-class question: 9.19 *Defect entanglement*
Friday
Read: Chapter 10, Sec. 10.1 (Correlation functions: motivation)
Pre-class question: 10.10 *Human correlations*
In-class question: 10.10 *Human correlations*
Monday
Read: Chapter 10, Sec. 10.3 (Equal-time correlations in the ideal gas) and 10.4 (Onsager's regression hypothesis and time correlations)
Pre-class question: 10.12 *Liquid free energy*

Exercises for everyone

9.16 *Can't lasso a basketball.* (Mathematics).

Select zero – one (4488) or one – two (6562)

9.17 *Fingerprints.* The tips of your fingers form a wonderful example of dislocations, disclinations, and smectic order.
9.7 *Superfluid order and vortices.* (Quantum, Condensed matter) There is a quantized vorticity (swirling motion) around defects in superfluids.
N1.17 *Nonabelian defects.* (Mathematics) An in-depth exploration of braiding and homotopy

for nonabelian defects.

N1.26 *Correlation matching.* Match configurations with real and Fourier space correlations.

10.11 *Subway bench Monte Carlo.* Compute the correlations between subway riders.