

Problem Set #4

Physics 436

Friday, 11 February 2022

The following problems come from Schroeder's *An Introduction to Thermal Physics*:

- Problem 2.18 on page 64 (*10 points*) \Rightarrow You work out the multiplicity of an Einstein solid in this problem. The result is important for later work.
- Problem 2.22 on page 66 (*15 points*) \Rightarrow You examine the width of the multiplicity of an Einstein solid in this problem. Use your Problem 2.18 results. Since the answers are given for parts (b) and (c), focus on understanding all of the details needed to arrive at the results.
- Problem 2.24 on page 67 (*20 points*) \Rightarrow A large two-state paramagnet is studied in this problem. If you do not get a Gaussian for part (b), you have made a mistake!
- Problem 2.30 on page 77 (*10 points*) \Rightarrow Work out the analytic result for part (c). You are trying to find

$$\frac{\Delta S}{k} = \left(\frac{S}{k}\right)_{\text{long}} - \left(\frac{S}{k}\right)_{\text{short}},$$

where the two terms on the right-hand side come from your answers to parts (a) and (b). Determining the numerical value of the above will help you answer parts (c) and (d).

Due date: **Friday, 18 February 2022**