Phys 404
Spring 2011
Homework 4, CHAPTER 3
Due Thursday, February 24, 2010 @ 12:30 PM

Early Warning: First hour exam is Thursday, March 10. **It will cover Chapters 1-4 (roughly) in the text. Books, notes, formula sheets, cell phones, and calculators may not be used during the test.**

Chapter 3 assignment: Read chapter 3, then do these problems in chapter 3:

1. K+K, Chapter 3, Problem 1

2. K+K, Chapter 3, Problem 3 Hint: Use the fact that $\sum_{s=0}^{\infty} x^s = \frac{1}{1-x}$ for $x < 1$.

3. K+K, Chapter 3, Problem 4 Hint: Given $Z = \sum_n e^{-\varepsilon_n/\tau}$, remember that $dZ/d\tau = \frac{1}{\tau^2}\sum_n \varepsilon_n \, e^{-\varepsilon_n/\tau}$

4. A Legendre transformation of the form d(τσ)=τdσ+σdτ changes the fundamental thermodynamic relation dU(σ,V) = τdσ - pdV into dF(τ,V) = -σdτ - pdV, while also providing the formula F = U-τσ. Use a Legendre transformation on the –pdV term to *derive* expressions for dH(σ,P) and for H(σ,P). H is called the enthalpy, and is useful for processes that occur at constant pressure.

General Hint:

Find the free energy directly from the partition function.