PHYS 321 Study Guide for Final

1. Study the Materials from Test #1 and Test #2.

2. Determine the density of the Superconductor YBa2Cu3O7.

Atomic masses: Y=88.91, Ba=137.3, Cu=63.55, O=16

 ![4: Crystalline structure of YBCO [13]  ]()

3. Compute the density for nickel at 500°C, given that its room-temperature density is 8.902 g/cm3. Assume that the volume coefficient of thermal expansion, αv, is equal to 3αl.
*l* for nickel is 13.3 × 10-6 (C)-1

4. *(a) Explain the two sources of magnetic moments for electrons.*

*(b)**Do all electrons have a net magnetic moment? Why or why not?*

*(c)**Do all atoms have a net magnetic moment? Why or why not?*

5. Assume there exists some hypothetical metal that exhibits ferromagnetic behavior and that has (1) a simple cubic crystal structure (Figure 3.3), (2) an atomic radius of 0.125 nm, and (3) a saturation magnetic field of 0.85 tesla. Determine the number of Bohr magnetons per atom for this material. 1 Bohr magneton = 9.27 x 10-24 A.m2. B = µ0M. µ0 = 1.257 x 10-6 T.m/A.

6. Compute (a) the saturation magnetization and (b) the saturation magnetic field for cobalt, which has a net magnetic moment per atom of 1.72 Bohr magnetons and a density of 8.90 g/cm3*.*