PHY 122 Pulsed NMR Pre-Lab

1. Read Melissinos pp 251-283.
2. For a proton magnetic resonance experiment with signal at 15 MHz, and T=300K, what is the ratio of the population of the excited spin state to the ground spin state?
3. What is the magnetic moment of l mm^3 of water under the conditions of (2)? What is the magnetic field produced by this magnetization at a distance of 1 mm, approximately? (Check Griffiths). This is the magnetic field you will be measuring. How big is it compared to the earth's magnetic field?
4. Why are the magnetic fields of the permanent magnet and the magnetic field induced by the Helmholtz transmitter coils at right angles? Suggest a reason the solenoidal nmr receiver coil is oriented at right angles to both the static field and the transmitter coil .
5. What mechanisms are responsible for the decay of the oscillating magnetization induced after the application of a 90^O tipping pulse? Which of these mechanisms can be reversed? How?