PHY 415

Homework 7

Due November 11, 2009

1. A proton of velocity 10^9cm/sec is projected at right angles to a uniform magnetic induction field of 10^3 Gauss.

a) What is the deflection in the path of the particle from a straight line after it has traversed a distance of 1cm?

b) How long would it take the proton to traverse a 90 degree arc?

2. Consider a sphere of radius R and permeability μ, placed in a magnetic field in vacuum, which is initially uniform along the z-axis, namely, initially, $\mathbf{B} = B\hat{\mathbf{z}}$. Determine the magnetic field, in the presence of the sphere, both inside and outside, namely, for $r < R$ as well as for $r > R$.

3. Consider two magnetic media with permeabilities μ_1 and μ_2, separated by a boundary surface without any free current. From the boundary conditions satisfied by the magnetic fields derive the "Snell's law" for the present case.