September 14, 1999

PHY 711 – Problem Set # 7

Consider a particle of mass m and charge q moving in a constant magnetic file $\mathbf{B} = B_0\hat{\mathbf{z}}$.

1. Show that this magnetic field can be described by the vector potential

$$\mathbf{A} = \frac{1}{2}B_0(x\hat{\mathbf{y}} - y\hat{\mathbf{x}}).$$

2. From Newton's second law in cartesian coordinates, the equations of motion of the particle.

3. Form the Lagrangian and determine the equations of motion, comparing your results with part (2).