PHYS 240 homework #6 – due Feb 15 2013, 5:00pm, upload to Canvas

Charged particle

1. The Lorentz force on a charged particle is $\mathbf{F} = q(\mathbf{E} + \mathbf{v} \times \mathbf{B})$ where $\mathbf{E}$ and $\mathbf{B}$ are the electric and magnetic fields acting on the particle and q is the particle's charge. Write a program to simulate the motion of an electron in uniform, perpendicular electric and magnetic fields. Show that the motion is helical in form, with a pitch that depends on the initial particle velocity and with a drift velocity $\mathbf{u}_{\text{drift}} = \mathbf{E} \times \mathbf{B}/B^2$. Use Python's 3D plotting.

2. Include any discussions and plots in a report generated in LaTeX. Also submit your Python code separately.