Homework #12 for Physics 371

Due Friday, April 29

1) Consider a particle of mass M and charge q in a constant magnetic field $\vec{B}$, described by the Hamiltonian

$$\hat{H} = -\vec{\mu} \cdot \vec{B}, \quad \text{where} \quad \vec{\mu} = \frac{q}{2Mc}\vec{L}.$$

Show that

$$\frac{d}{dt}\langle \vec{L} \rangle = \vec{\Omega} \times \langle \vec{L} \rangle, \quad \text{where} \quad \vec{\Omega} = -\frac{q\vec{B}}{2Mc}.$$

$\Omega = qB/2Mc \equiv |\vec{\Omega}|$ is known as the *Larmor frequency.*

2–6) Griffiths 4.32, 4.49, 4.58, 5.5, and 5.7.