Physics 217
Problem Set 10
Due: Friday, Nov 16th, 2018

1. (10 points) Problem 39 from Chapter 7 of the Harris book.

2. (10 points) Problem 43 from Chapter 7 of the Harris book.

3. (10 points) Verify that $[\boldsymbol{L}^2, L_z] = 0$.

4. (10 points) Show that the $\ell = 1, m_\ell = 1$ spherical harmonic $Y_{11}(\theta, \phi)$ is a solution of the angular part of the Schrödinger equation for a central potential

$$\frac{d^2 Y_{\ell m_\ell}}{d\theta^2} + \cot\theta \frac{dY_{\ell m_\ell}}{d\theta} + \frac{1}{\sin^2\theta} \frac{d^2 Y_{\ell m_\ell}}{d\phi^2} = -\ell(\ell+1) Y_{\ell m_\ell}$$

$$\frac{d^2 Y_{\ell m_\ell}}{d\phi^2} = -m_\ell^2 Y_{\ell m_\ell}$$