PHY 6646 - Quantum Mechanics II - Spring 2020
Homework set # 1, due January 15

1. By applying the orbital angular momentum raising and lowering operators to $Y_l^0(\theta, \phi)$, show that

$$Y_l^m(\theta, \phi)^* = (-1)^m \ Y_l^{-m}(\theta, \phi) \qquad . \tag{0.1}$$

2. Consider an orbital angular momentum state $|l = 2, m = 0 >$. Suppose this state is rotated by an angle β about the y-axis. Find the probabilities that the rotated state has $m = 0, \pm 1, \pm 2$.

3. Problems 12.6.5, 12.6.8, 12.6.9 and 12.6.10 in Shankar's book.