NOTE: Be sure to show your work and explain what you are doing. (Correct answers, for which we cannot follow the work, are worth no credit).

1. Problem 4.2.5 (A&W)(10 points)

2. Problem 4.2.6 (A&W)(10 points)

3. Prove the following (10 points)
   
   (a) Prove (5 points)
   
   \[ D_{m_1, m_1'}(R)D_{m_2, m_2'}(R) = \sum_j \sum_m \sum_{m'} \langle j_1 j_2 m | j_1 m_1; j_2 m_2 \rangle \langle j_1 m_1'; j_2 m_2' | j_1 j_2 m' \rangle D_j^m(m) \]  

   where \( j \) sums from \( |j_1 - j_2| \) to \( j_1 + j_2 \)

   (b) For the case of \( m_1' = m_2' = 0 \) and using the identity \( Y_l^m(\theta, \phi) = \sqrt{\frac{(2l+1)}{4\pi}} D_l^m(\alpha = \phi, \beta = \theta, \gamma = 0) \)

   show (5 points):

   \[ \int d\Omega Y_l^{m'}(\theta, \phi)Y_{l_1}^{m_1}(\theta, \phi)Y_{l_2}^{m_2}(\theta, \phi) = \sqrt{\frac{(2l_1 + 1)(2l_2 + 1)}{4\pi(2l + 1)}} \langle l_1 l_2 00 | l_1 0 0; l_2 0 0 \rangle \langle l_1 m_1; l_2 m_2 | l_1 l_2 m \rangle \]  

4. Problem 4.4.2 (A&W)(10 points) Hint: Use problem 3

5. Bonus Problem 4.3.1 (A&W)(5 points)