PH 451 **Winter 2026**

Worksheet # 16

(Friday, February 20, 2026)

Name

Questions (5 pts):

(a) Use the table of Clebsch-Gordan coefficients for the addition of $j_1 = 1$ and $j_2 = ½$ to present the state $|½\,½\rangle$ in the coupled basis in terms of states in the uncoupled basis. Label all the quantum numbers in your expression (i.e. J, M, j_1, j_2, m_1, m_2).

(b) If you have time: use the result of (a) to solve the following problem.

An electron in a p-state (l = 1) has a total angular momentum (**J** = **L**+**S**) of J = ½. It is also known that the total angular momentum has a maximal possible positive projection on the z-axis for this value of J. What is the probability of finding the electron in the spin-down configuration?