

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 $j_2 = \frac{1}{2}$ to present the state $|\frac{1}{2} \frac{1}{2}\rangle$ 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) use the result of (a) to solve the following problem.

An electron in a p-state ($l = 1$) has a total angular momentum ($\mathbf{J} = \mathbf{L} + \mathbf{S}$) of $J = \frac{1}{2}$. 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?