Worksheet # 15

(Wednesday, February 18, 2026)

Name

Questions (5 pts):

An electron in the hydrogen atom is in a p-state (i.e. the orbital quantum number $l = 1$). The total angular momentum $\mathbf{J} = \mathbf{L} + \mathbf{S}$.

(a) Apply the rules of addition of angular momenta to find the possible values of the quantum number for the total angular momentum J.

(b) Write down the possible states |J M>.

(c) **If you have time:** how many states |J M> are there ? Compare this number to the number of states in the corresponding uncoupled basis |l m_l s m_s> and comment.