AST 393F
Exam 1

1. a) Make sketches of the electron probability distribution in the hydrogen atom in the 1s, 2s, and 2p(m_l=0) states.

b) If a hydrogen atom in the 1s state were put in an electric field, what other states would be mixed in with the 1s state by this perturbation? (Name at least one.) Make a sketch of the resulting electron probability distribution.

c) Give a quantum number that is no longer a good quantum number in this perturbed state. Give a quantum number that is still a good quantum number.

d) If the electric field could be turned off very suddenly (in less than 10^{-16} s), how would you expect the probability distribution to evolve in time?

2. What do the various numbers and letters in the following stand for?
$1s^2 2s^2 2p 3s\ ^2D_2$ Why couldn't this state exist?