

## AST 300B – Spring 2017

### In-class/take-home Problems Due: Wednesday April 19th

42. Consider the ground state electronic configuration of neutral Carbon:  $1s^2 2s^2 2p^2$ .

(a) Using just the 2 valence electrons ( $2p^2$ ), what are the possible scalar values of  $L$  and  $S$  – the total orbital angular momentum and the total spin?

(b) For each combination of possible  $L$  and  $S$ , what are the scalar values of  $J$ , the total angular momentum? Make a table of these possible combinations.

(c) What are the terms that correspond to each combination of  $L$ ,  $S$ , and  $J$  in your table?

(d) Now consider the situation where one of the  $2p$  electrons is excited into the next highest  $3s$  energy level such that the valence electron configuration is now ( $2p^1 3s^1$ ). Repeat parts (a) through (c) and determine the possible terms for this excited electronic state of Carbon.

