1. Don’t just sit there and think about it...draw! There is no substitute for drawing splitting
diagrams (“trees”) or, better yet, stick diagrams. An alternative is to use one of the many
available computer programs (some web-based) for the simulation of first-order spectra.

2. Start by counting the lines. Number them if it helps you keep track. Then record the
relative intensities (heights, if the linewidths are consistent), keeping in mind that
overlapped lines can mislead you.

3. The “wings” (near the edges) of the multiplet are the easiest part of the spectrum to
analyze. Don’t start in the middle...you will only get frustrated, unless the multiplet is so
easy that you can solve it immediately “by inspection”.

4. The separation between the 1st (outermost) line and the 2nd line is always equal to the
smallest J. (Note: it doesn't matter whether you start at the right or left.) One has to be
careful though, because sometimes the intensity of the 1st line is so low that it is missed.

5. The ratio of intensities (really integrations) of the 1st and 2nd lines is very informative. It
should fit the intensity ratio for the 1st and 2nd lines of a simple first-order multiplet (s, d, t,
etc.). Again, be careful...if the 2nd line is overlapped with the 3rd, intensities will be
suspect.

6. The intensity of the 1st line is 1/2N of the total multiplet intensity, where N is the total
number of protons which are coupled with the multiplet being analyzed. Each line in the
multiplet is an integral number times the intensity of the 1st line.

7. The separation between the 1st line and the 3rd line is equal to the second smallest J, or
twice the smallest J, or both. Again, look at the relative intensities, and be cautious.

8. The separation in Hz between the outermost lines must equal \[ \sum n_i J_i \], where \( n_i \) is the
number of coupled nuclei with coupling constant \( J_i \).

9. A multiplet having no intense center line indicates the presence of an odd number of
nuclei in one or more of the coupled sets. The observation of a center line does not
exclude the presence of an odd number of nuclei in one or more of the of the coupled sets.

10. One reasonable strategy for analysis is to sequentially remove couplings one at a time,
starting with the smallest J, generating a new simpler multiplet after each removal. The
ultimate stick diagram reconstruction, if it is correct, should accurately reproduce the line
positions, especially in the wings of the spectrum. If there are serious overlap problems,
then a computer simulation should be carried out.