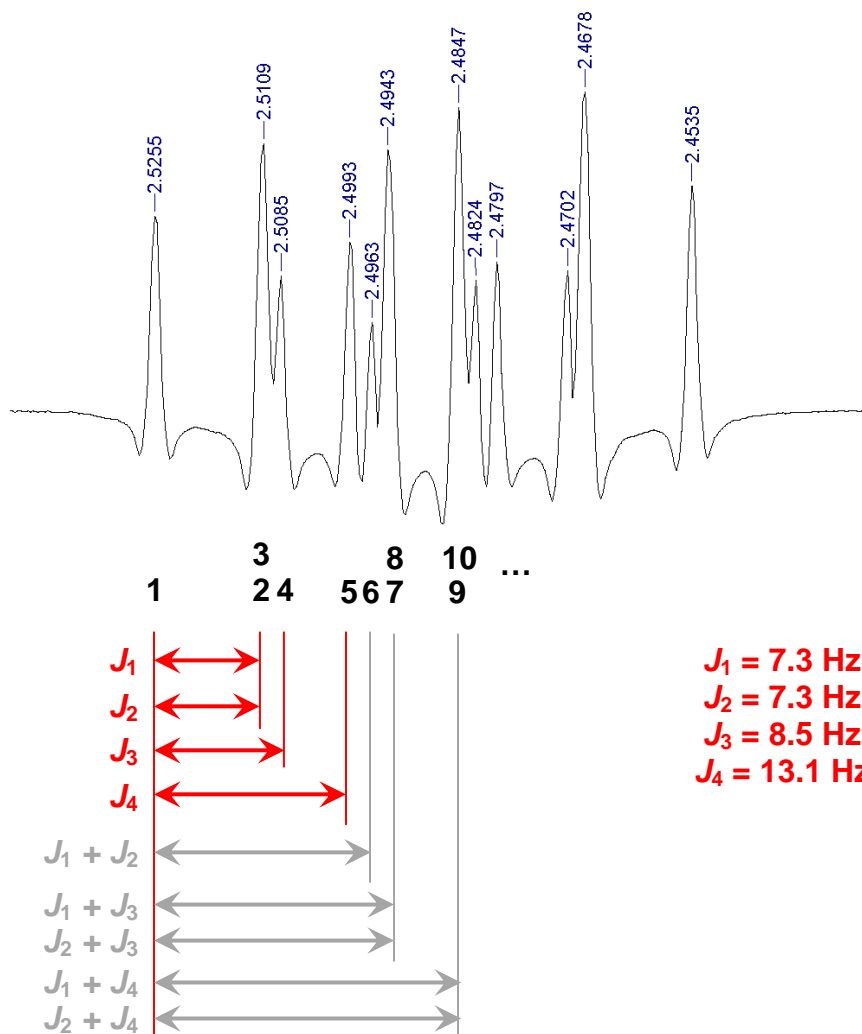
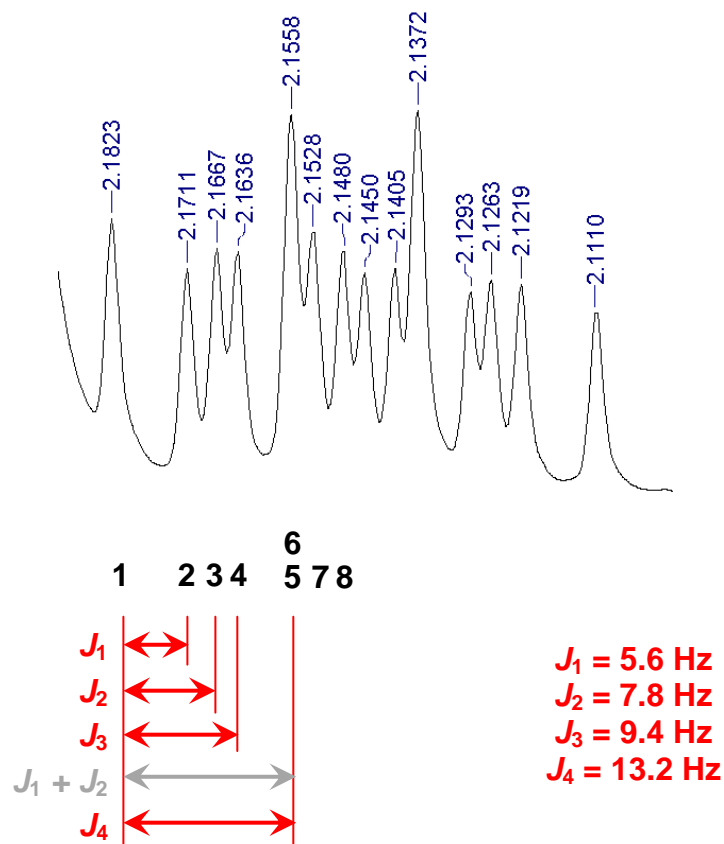


Discussion Section Exercise Solutions
Complex Splitting Patterns in ^1H NMR

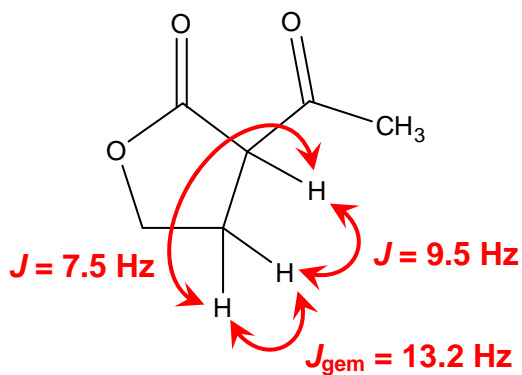
1. I labeled the resolution-enhanced multiplet with the following labels:



And for the other upfield multiplet,



We can also pretty easily figure out the doublet of doublets at $\delta = 3.6 \text{ ppm}$ as having $J_1 = 7.5 \text{ Hz}$ and $J_2 = 9.5 \text{ Hz}$. The 7.5 Hz J could match either of our complex multiplet partners, but the 9.5 Hz J could only match the second one. So coupling in the molecule probably looks like:



2. The problem with the overlapping multiplets at 4.15 ppm is that they couple one another, and because, for that coupling constant, J is on the same order as the chemical shift difference between the multiplets. Or, to put it another way, $\Delta\nu/J$ is very small. This leads to distortions in the intensities and observed splitting of peaks, which makes figuring out these multiplets pretty difficult.

3.

