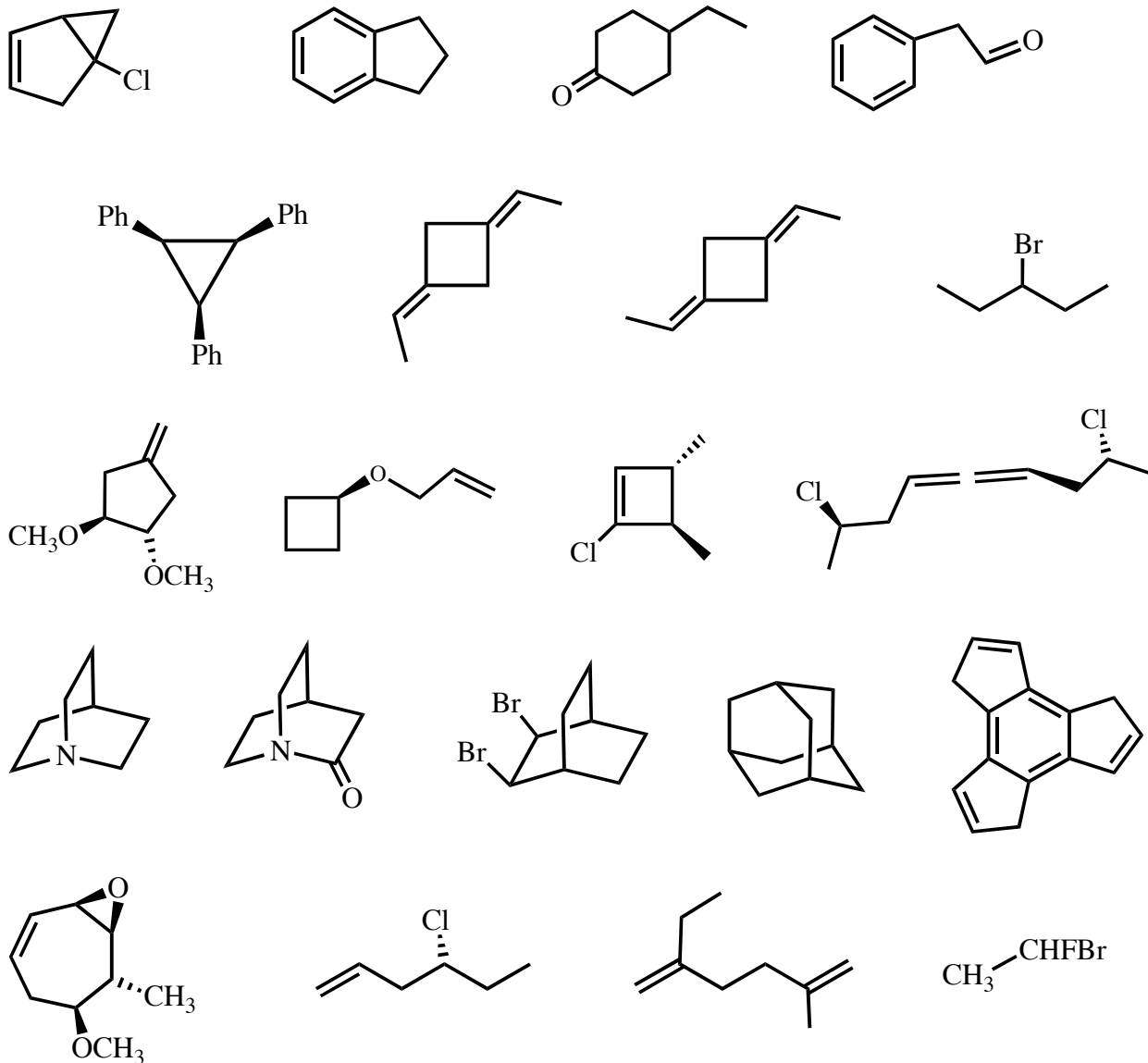


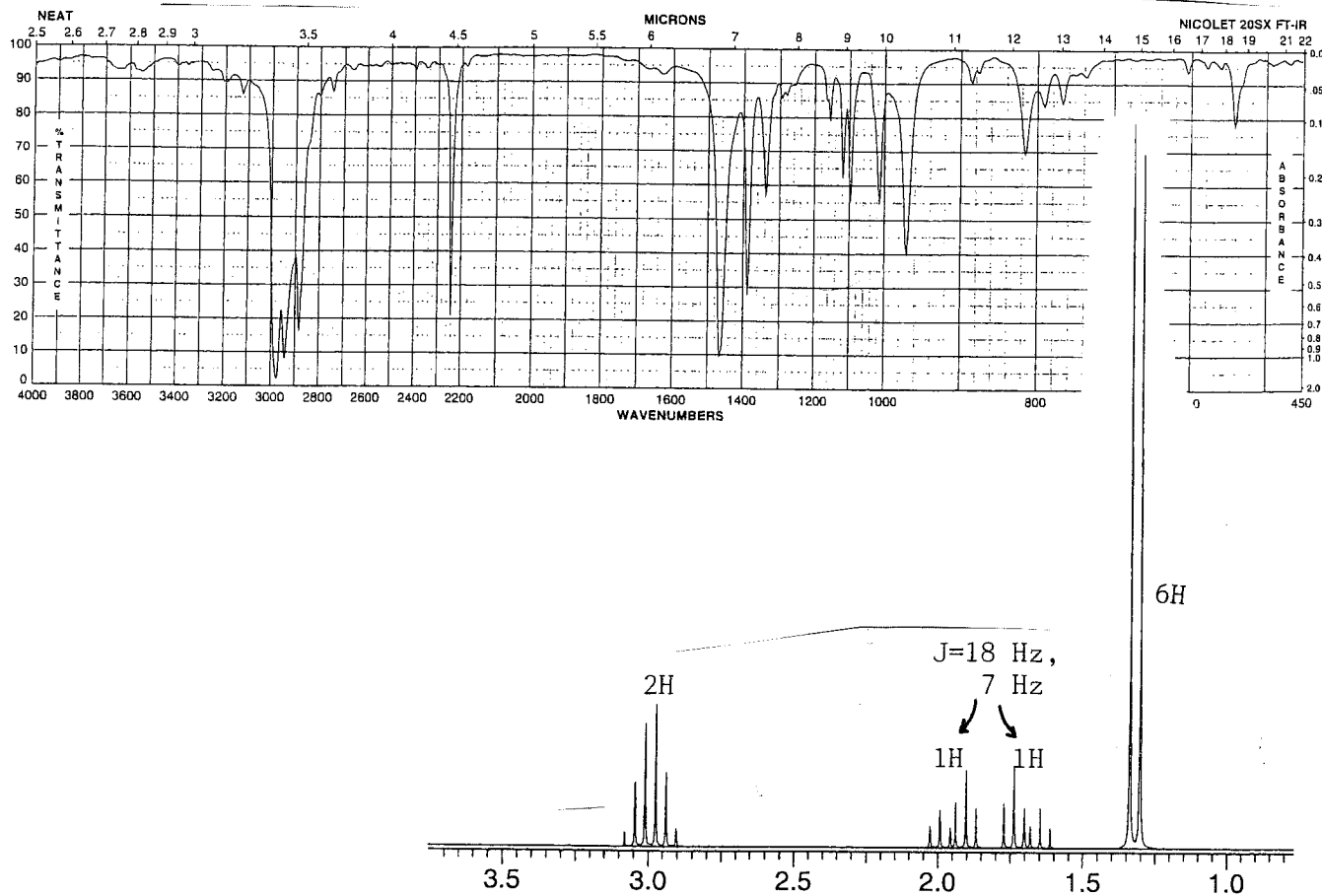
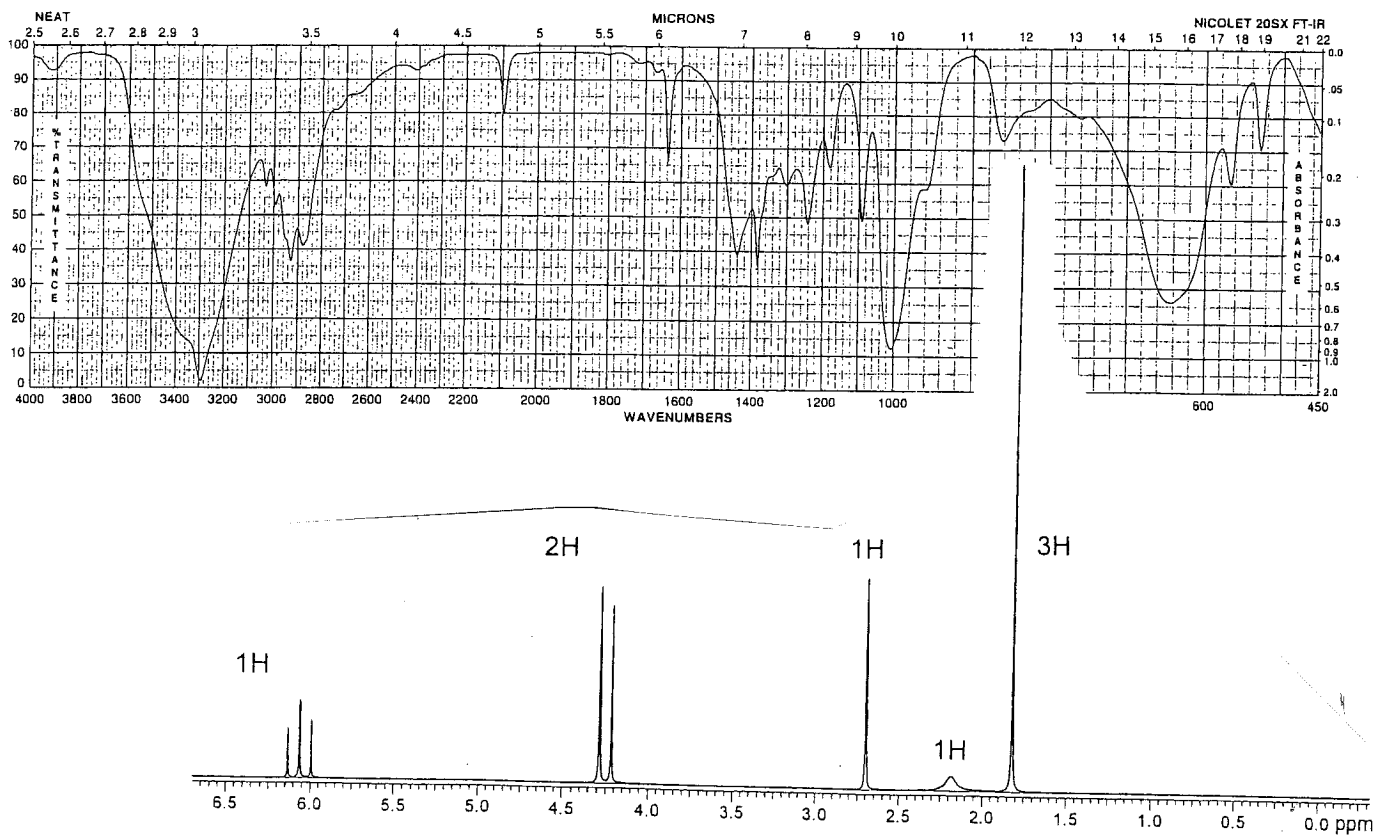
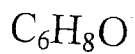
No graded part this time. Solutions will be posted on Monday after discussion.

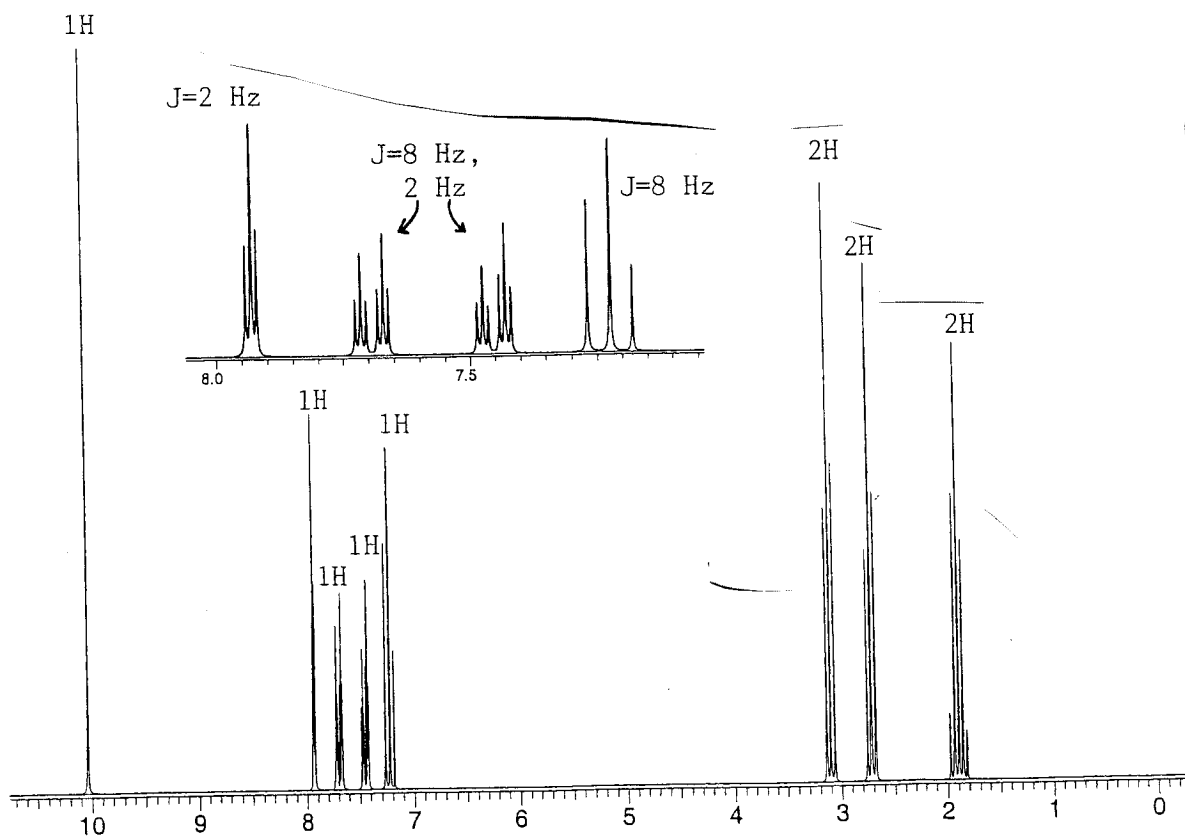
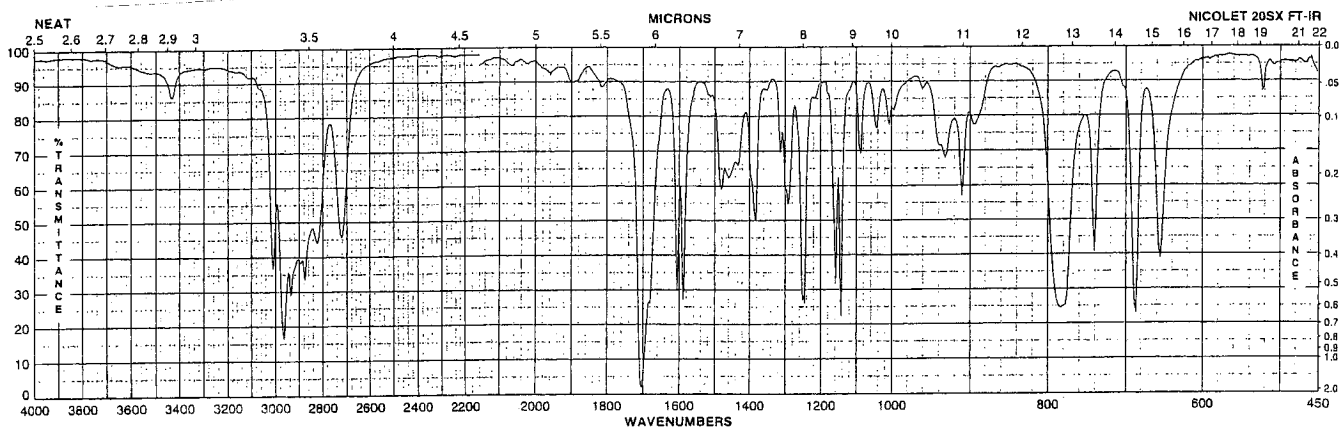
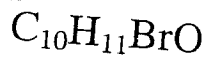
1. (a) For each compound below, how many separate signals would you expect to see in a (room temp) proton-decoupled ^{13}C NMR spectrum, and how many in a ^1H NMR spectrum? Atoms are the same if they are related by a symmetry element or if they are interchanged by a process that is fast on the NMR timescale.

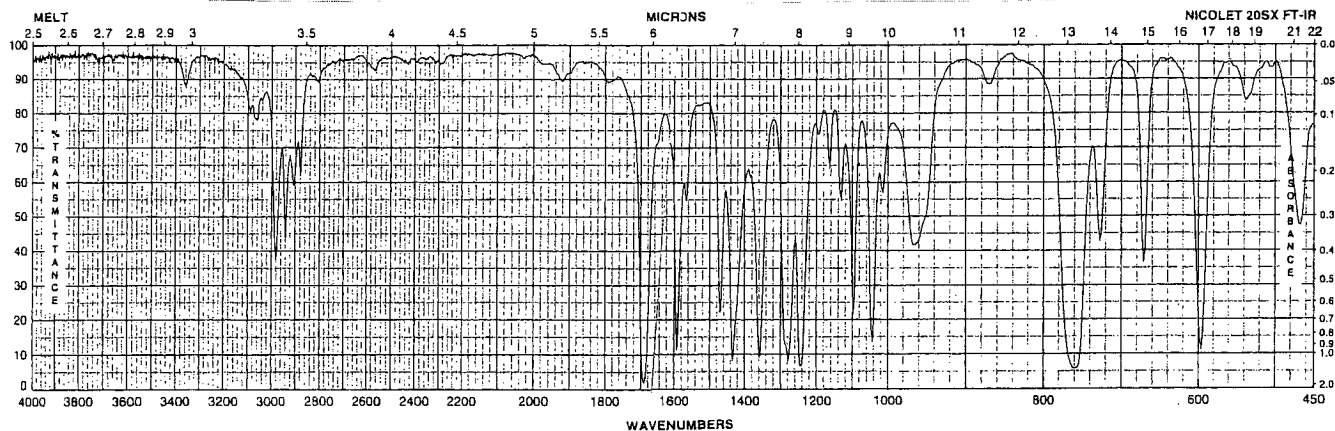
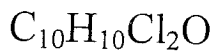


Note that you should not expect problems like this to constitute half the exam; there are so many only because once you get started it's hard to stop, it's a good chance to revisit geometry and molecular symmetry, and — gosh darn it — they're just good clean old fashioned fun.

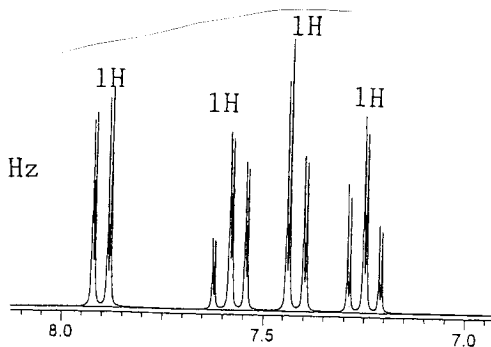
2. A few more IR/NMR problems appear on the following pages.







for all four signals, $J=8$ Hz and 1.5 Hz



for both signals, $J=15$ Hz and 7 Hz

