Answers to Problem 80, Chemistry 301X - 2006

First, use your Table to determine that the two esters are in bottle 1 and 3, (IR conjugated C=O stretch at about 1720 cm^{-1}) and the two ketones are in bottles 2 and 4 (IR conjugated C=O stretch at about 1680 cm^{-1}).

Now, the chemical shift data allow a quick determination of the rest of the problem. Again, there are several ways to do this last part, but the easiest is to look at the chemical shift of the singlet methyl group (you could also use the methylene quartet). A methyl group next to an oxygen has a chemical shift δ of about 4.5, and a "benzylic" methyl group directly attached to a benzene ring has a δ of about 2.3. So Compound **E** is in bottle 1, and compound **F** is in bottle 2. Similarly, compound **G** is in bottle 3, and compound **H** is in bottle 4.