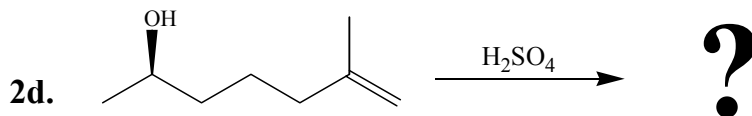
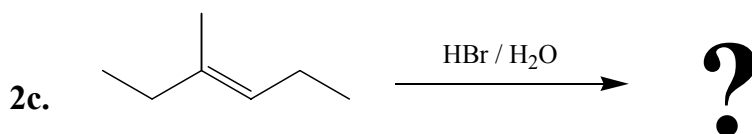
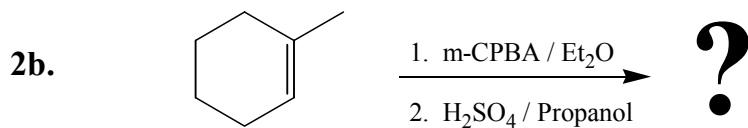
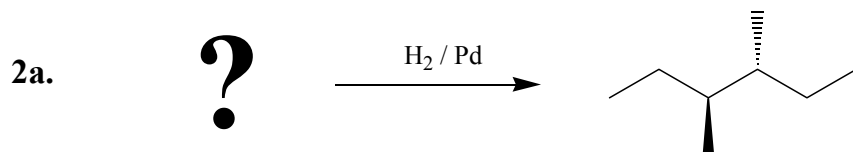
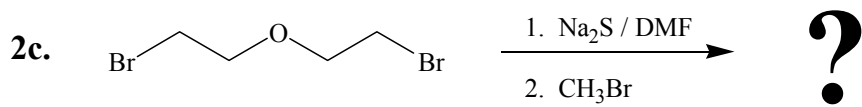
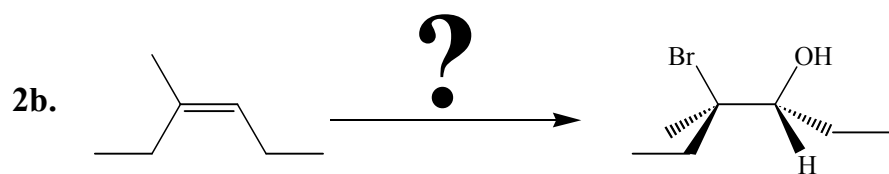
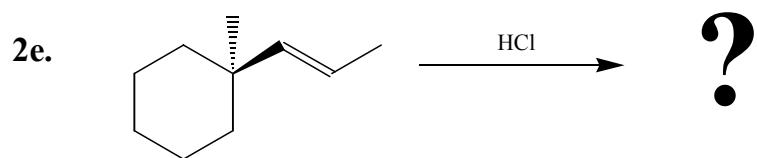


2. Consider the following reactions. Provide an answer that satisfies the question mark: Either predict the major product for each reaction **OR** provide the reagents for each synthesis (more than one reaction may be required). Pay Close attention to stereochemistry. Concisely explain your rationale: (49 points – 7 points for each)

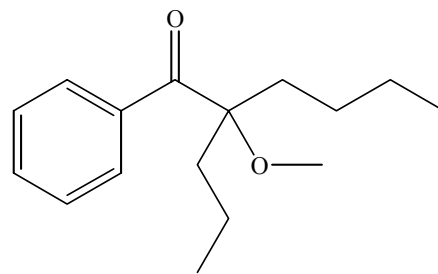


2cont.



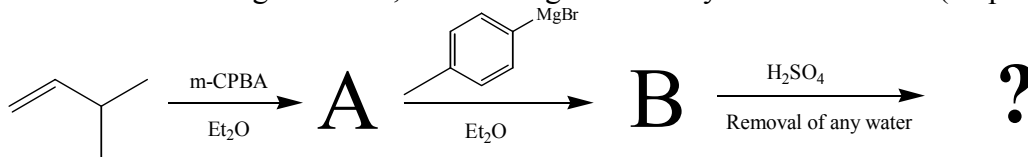
3. Consider the following molecule: (18 points)

3a. Provide a retrosynthetic analysis for this molecule with at least two different synthetic pathways, each involving at least three reactions. Do not provide a mechanism and ensure that you think about this problem in the proper manner (12 pts)



3b. Choose the best route and provide an appropriately presented synthesis of this molecule (6 points)

4. Bob conducted the following reactions, culminating with a dehydration reaction: (30 points)



4a. Conversion of A to B is considered a regioselective reaction. What does that mean? (2 pts)

4b. What is the structure of B and why is this particular reaction regioselective? Show a mechanism and explain briefly (7 pts)

4c. Why is the last reaction considered a dehydration reaction? What is the mechanism for the reaction? (7 pts)

4e. Why is it necessary to remove any water? (2 pts)

- 4f. When Bob completes the last reaction and analyzes it by GC-MSD, he notes that three products are formed. Each product has a mass of 160 amu. Upon isolation of each compound by column chromatography, Bob discovers that the IR spectra are nearly identical with characteristic bands at 3050 cm^{-1} and 1625 cm^{-1} . By NMR he can tell that there are definitely two compounds that are very similar and one that is different, but he is unable to interpret the spectra completely. Based on your knowledge of the above reactions and complex NMR spectra, designate and describe the SINGLE most characteristic NMR peak for each product. For any complex spectral peaks, include a detailed coupling analysis and a drawing of the peak. Use this analysis to show how you would differentiate between the three products using NMR spectroscopy. (12 pts)