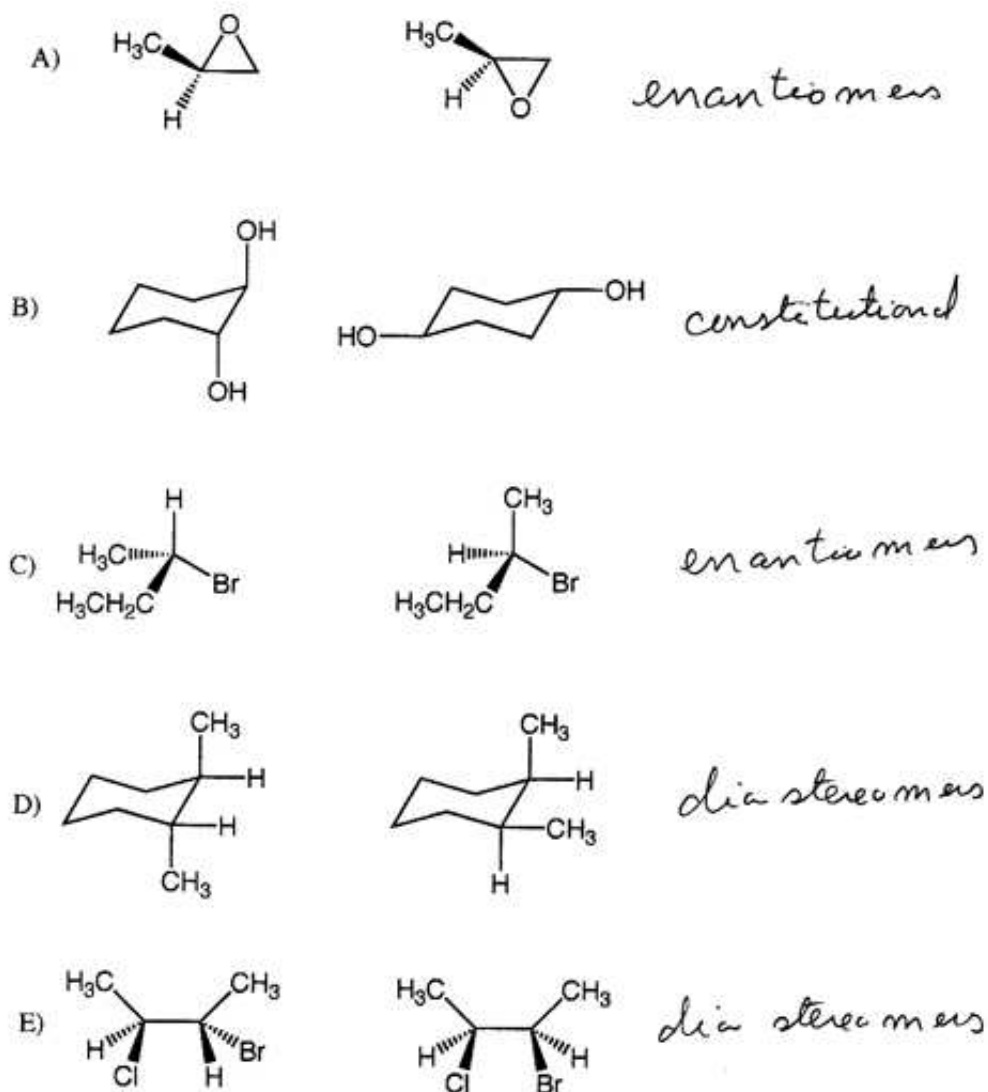
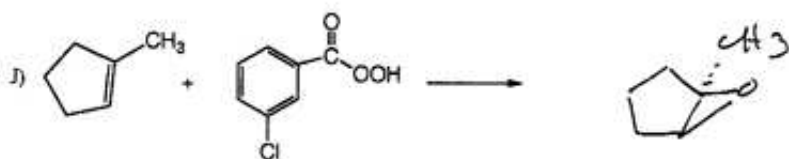
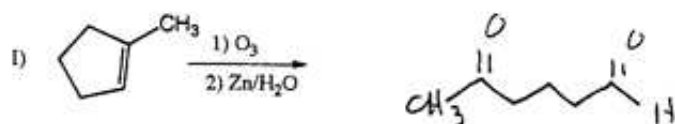
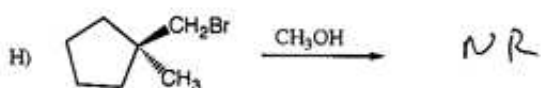
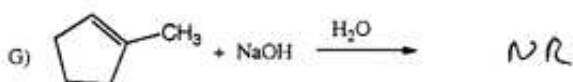
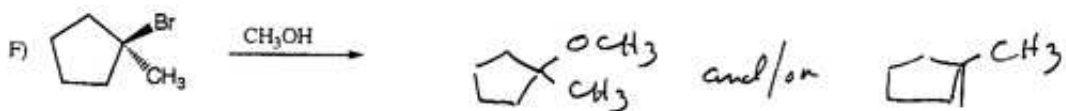
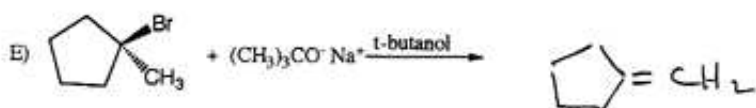
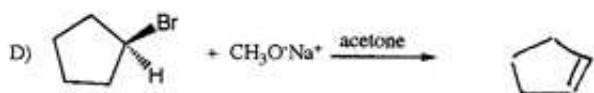
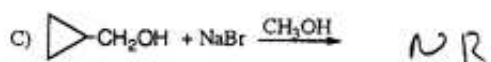
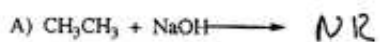


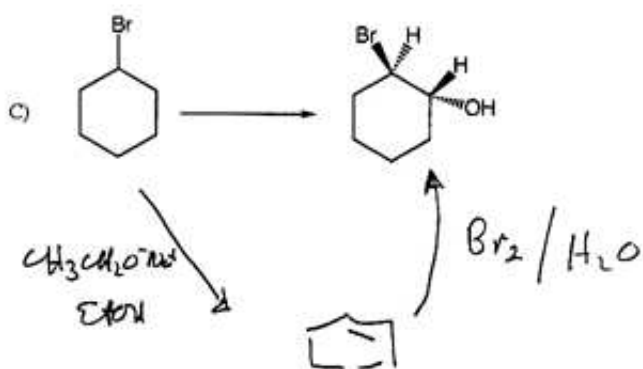
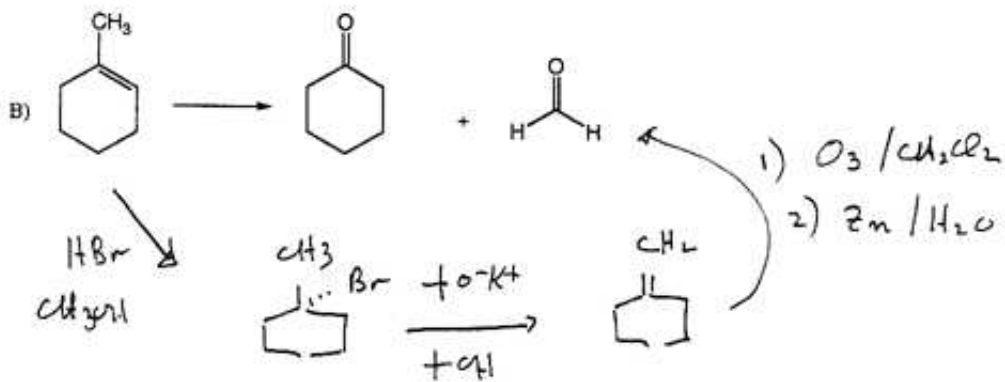
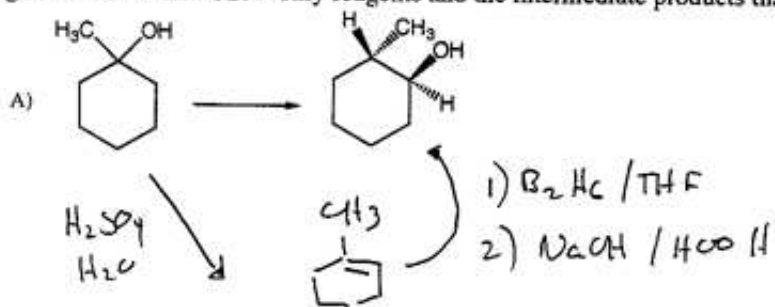
**Problem 1. (15 points)** What are the stereochemical relationships between the following pairs of molecules?



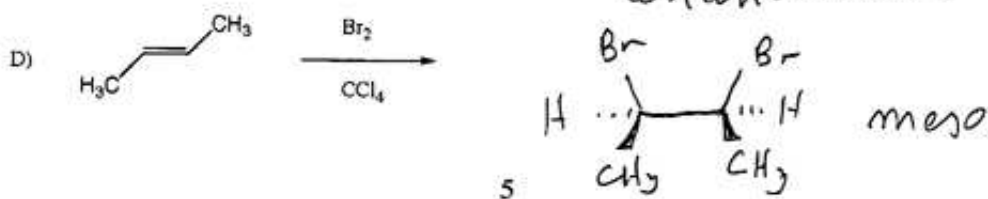
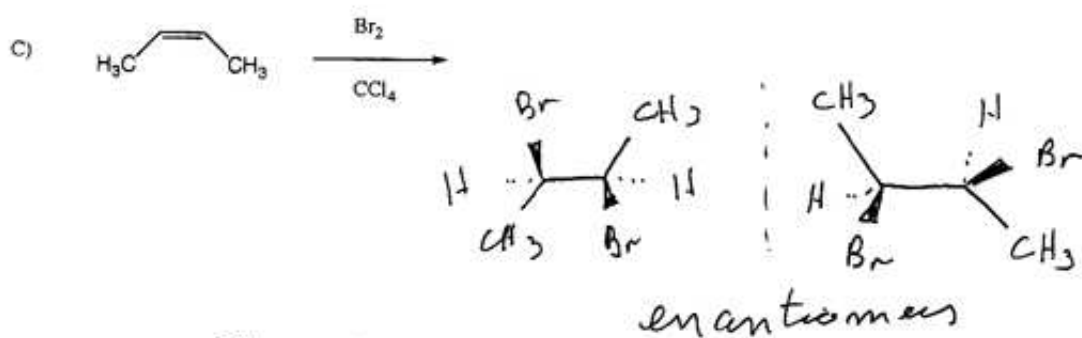
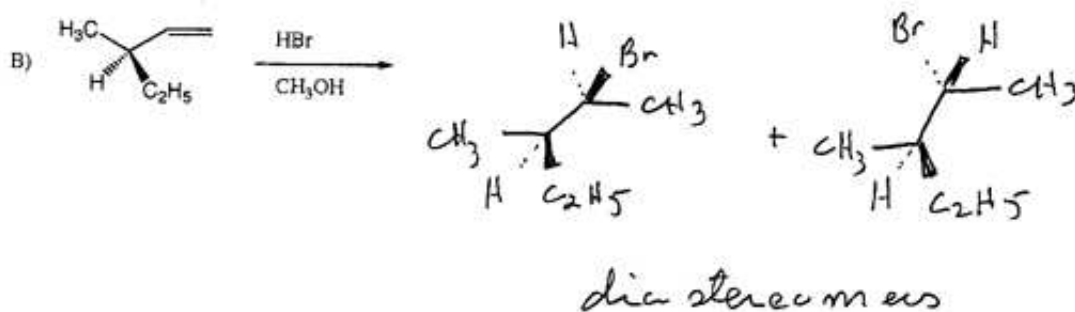
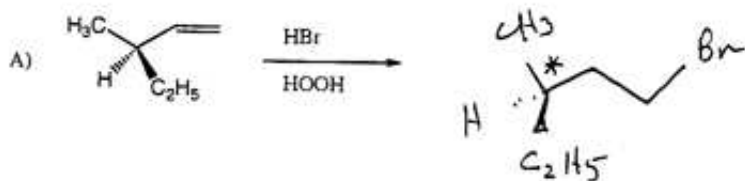
**Problem 2. (30 points)** Give only the major product for the following reactions. If no reaction occurs, please state so.



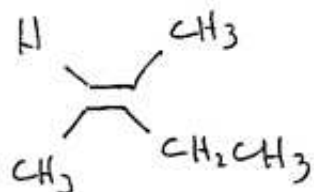
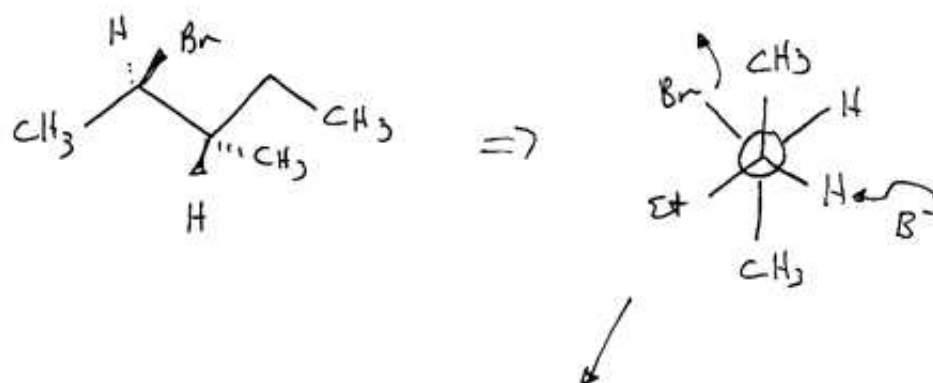
**Problem 3. (15 points)** Show how you would carry out the following transformations. Do not give mechanisms. Show only reagents and the intermediate products that are formed.



**Problem 4. (30 points)** Give the major product or products formed in the following reactions. If more than one product is formed, give the stereochemical relationship between the two products. If the product is a meso compound please state so. Be sure to show each center of chirality clearly.



**Problem 5. (10 points)** When (2R,3S)-2-bromo-3-methylpentane reacts in the presence of  $\text{CH}_3\text{O}^-\text{Na}^+$  in methanol, an alkene is formed. What is the major product formed and give its IUPAC name.



(Z)-3-methyl-2-pentene