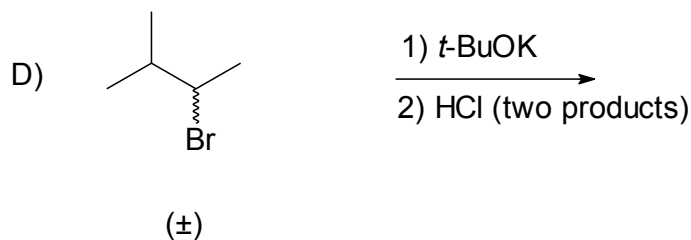
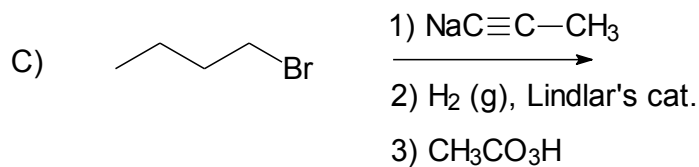
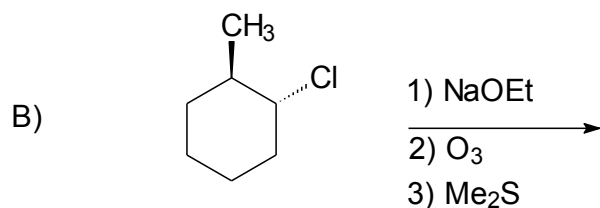
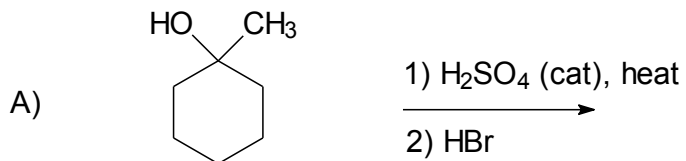
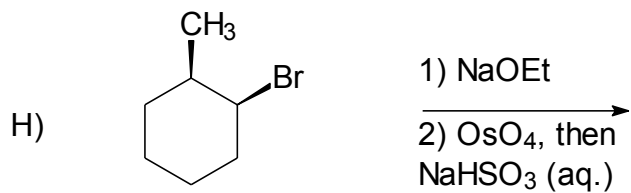
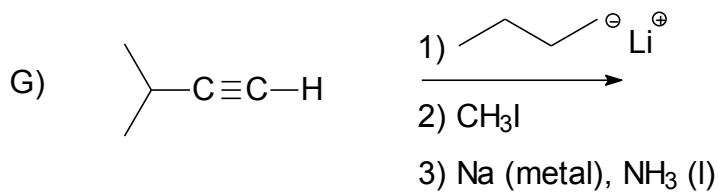
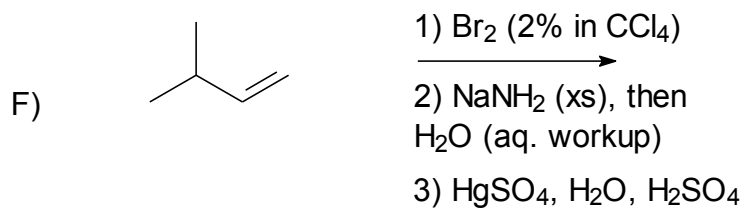
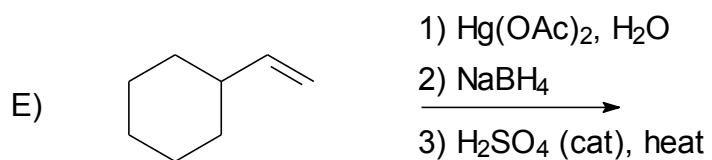
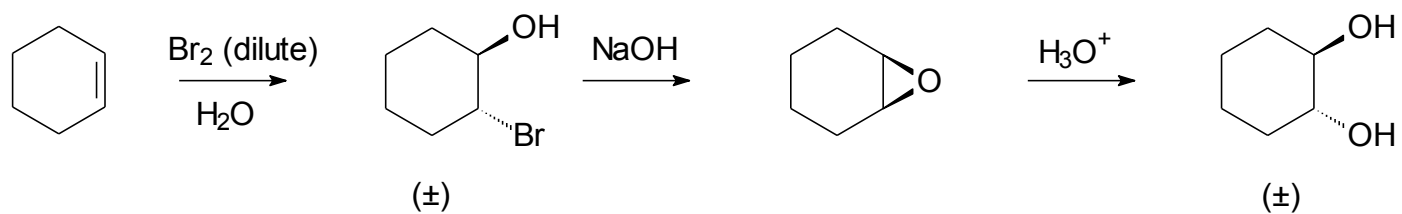


1. (40 pts) Draw the structure(s) of the **MAJOR** organic product(s) formed after **each step** in the following reactions. *Draw the correct product stereochemistry where applicable.* You may indicate racemic mixtures by using the ( $\pm$ ) symbol. Each problem is worth 5 pts.

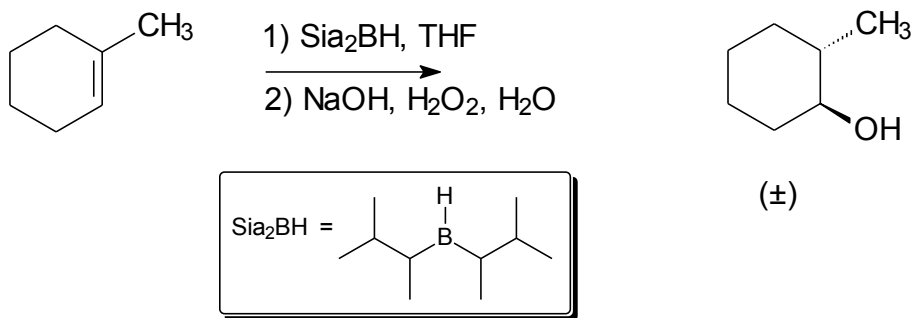




2. (15 pts) Provide a complete, step by step mechanism for the following transformation. Draw the structures of all intermediates formed in the mechanism. Use arrows to show "pushing" of electrons.



3 (15 pts) Provide a complete, step by step mechanism for the following transformation. Draw the structures of all intermediates formed in the mechanism. Use arrows to show "pushing" of electrons.



4. (15 pts) Provide a complete, step by step mechanism for the following transformation. Draw the structures of all intermediates formed in the mechanism. Use arrows to show "pushing" of electrons.

