2. 1. Show how you would accomplish the following synthesis. Include all isolated intermediate compounds and reagents over the arrows. Use only the starting alkene as your carbon source.

2. 2. Write the mechanism and the product(s) in 3-D of the following reaction showing all intermediates and electron-pushing arrows.

3. 3. Give the major product(s) of the following reactions showing stereochemistry in 3-dimensions where necessary and including all stereoisomers. Indicate if the product(s) are optically active (O), racemic (R) or achiral (A).

   a) \( \text{CH}_2\text{I}_2 \), Zn(Cu)

   b) \( \text{HCBr}_3 \), KOt-Bu

   c) \( \text{KBr} \)

   d) \( \text{HBr} \)