1. Give the structure of the major organic product(s) or supply the missing reactant/conditions or starting material. Show the stereochemistry of the products or starting material, if applicable.

   a) \[ \text{Br} \quad \text{NaOCH}_3 \quad \text{major} \quad + \quad \text{any other good LG} \]

   b) \[ \text{H}_2\text{SO}_4 \quad \text{H}_2\text{O} \quad \text{?} \quad \text{OK} \quad \text{OH} \]

   c) \[ \text{i. O}_3 \quad \text{?} \quad \text{Me}_2\text{S} \quad \text{H} \quad \text{OMIT} \]

   d) \[ \text{OCH}_3 \quad \text{PBr}_3 \quad \text{OH} \quad \text{OCH}_3 \]

2. Suggest an efficient synthesis of the following compounds:
   a) Butylcyclohexane from ethane

   b) Trans-2-butene from 2,3-dibromobutane

3. Propose a curved-arrow mechanism for the following reaction: