1. Predict the product(s) of the following reactions. If more than one product is possible, show all of them and indicate their relative quantities. Pay attention to stereochemistry.
#1 (continued)

\[ \text{H}_2\text{C} - \text{CH}_2\text{CH}_3 \text{OH} \xrightarrow{\text{H}_2\text{SO}_4} \text{major} \]

\[ 1) \text{KMnO}_4, \text{OH}^-, \text{heat} \]
\[ 2) \text{H}_2\text{O}^+ \]

\[ \text{KMnO}_4, \text{OH}^-, \text{cold} \]

\[ 1) \text{O}_3, \text{CH}_2\text{Cl}_2, -78^\circ \text{C} \]
\[ 2) \text{Zn} / \text{HOAc} \]

\[ 1) \text{Hg(OCCF}_3)_2 / \text{CH}_3\text{CH}_2\text{OH} \]
\[ 2) \text{NaBH}_4 / \text{NaOH}_{\text{aq}} \]

\[ \text{racemic} \]

\[ \text{H} - \text{Me} \]
\[ \text{NaOEt} / \text{EtOH} \]

\[ \text{major} + \text{minor} \]
2. Devise reasonable synthetic routes for the following, using the given reagents as the only source of carbon. Indicate the reagents needed and the products for each step. You do not need to include mechanisms.

(see next page)

3. Suggest an appropriate starting alkene and reaction conditions to produce the following alcohols:

* Other possibilities exist for all 3

* May not use H₂SO₄ catalysis on A or C or rearrangements are possible
4. Which of the following two isomers would react fastest in an E2 reaction mechanism where NaOCH(CH₃)₂ in HOCH(CH₃)₂ is used as a base? Explain, using relevant structures to illustrate.

A:  
[Diagram of A]

B:  
[Diagram of B]

A reacts faster
Br is essentially locked into the axial position required to achieve an anti-coplaner arrangement w/ H.

B reacts slower (if at all)
Br is essentially locked into the equatorial position & cannot achieve the coplanar arrangement with a H required for elimination.
In order to react, the bulky E-Br₂Br would have to be axial.