1. (a) Fill in the reagents and products, as needed, in the scheme below.

(b) Draw mechanisms for the two reactions of the epoxide shown above.

2. Propose a synthesis of the molecule shown below, using ethylene and bromobenzene as sources of carbon.
3. Show how you would perform the following synthesis.

\[
\begin{align*}
\begin{array}{c}
\text{Br} \\
\end{array} & \xrightarrow{\text{MCPBA, CH}_2\text{Cl}_2} & \begin{array}{c}
\text{OH} \\
\end{array} \\
\end{align*}
\]

4. Draw the mechanism of the following reaction.

\[
\begin{align*}
\begin{array}{c}
\text{CH}_2\text{CH} \\
\end{array} & \xrightarrow{\text{1. MCPBA, CH}_2\text{Cl}_2, \text{2. NaOCH}_3, \text{CH}_3\text{OH}} & \begin{array}{c}
\text{OH} \\
\end{array} \quad \begin{array}{c}
\text{OCH}_3 \\
\end{array} \\
\end{align*}
\]
5. Show how you would accomplish the following synthesis.

6. Synthesize the following diol in two different ways starting from an alkene.