1. Give the major product(s) of the following reactions showing stereochemistry in 3-dimensions where necessary and including all stereoisomers.
   
   a) $\text{Cu}$
   
   b) $\text{Hg(OCOCCH}_3)_2$, $\text{NaBH}_4$, $\text{NaOH}$
   
   c) $\text{HgSO}_4$
   
   d) $\text{HBr}$
   
   e) $\text{H}_5\text{IO}_6$
   
   f) $\text{CH}_3\text{MgBr}$, $\text{CH}_3\text{CH}_2\text{OTs}$

2. Show how you would accomplish the following synthesis. Include all isolated intermediate compounds and reagents over the arrows.

\[
\begin{array}{c}
\text{Br} \\
\text{O} \\
\text{H}_2\text{O}
\end{array}
\rightarrow
\begin{array}{c}
\text{O} \\
\text{OH} \\
\text{H}
\end{array}
\]

3. Draw the mechanism of the following reaction showing all intermediates and electron Pushing arrows.

\[
\begin{array}{c}
\text{O} \\
\text{H} \\
\text{H}_3\text{O}^+
\end{array}
\rightarrow
\begin{array}{c}
\text{OH} \\
\text{O} \\
\text{H}
\end{array}
\]