1.a) Benzylc carbocations, which have the positive formal charge on a carbon atom bound to an aromatic ring, are known for their relatively high stability (as compared to other carbocations). Draw resonance structures for the benzylc carbocation shown which account for this stability.

b) Predict the product of the reaction shown below.

2. Predict the products of the following reactions. If the reaction yields similar amounts of more than one product, draw them both.
3. Name the following. If a stereoisomer exists draw and name it.

(†)-1-chloro-5-methyl-1,3-pentadiene

(‡)-1-chloro-5-methyl-1,3-pentadiene

(‡)-2-bromo-3-sec-butyl-4-chloro-6-ethyl-1-methyl-3,5-octadiene

(†)-2-bromo-3-sec-butyl-4-chloro-6-ethyl-1-methyl-3,5-octadiene

4. Draw the product for the following reactions. Draw the mechanism for the second reaction.

\[
\text{HCl} \quad \xrightarrow{\text{Et}_2\text{O}} \quad \text{Cl} \quad \xrightarrow{\text{Cl}_2} \quad \text{C}_6\text{H}_{12} \quad \xrightarrow{\text{Cl}_2\text{O}}
\]

Mechanism:
5. Look at the following reactions. What is going on here? Draw the mechanism for the formation of each product in each reaction. You may want to put in the carbons and hydrogens.

(a) \[
\begin{align*}
\text{HCl} & \quad \rightarrow \\
\text{Cl} & \quad + \\
\text{Cl} & \quad \text{major}
\end{align*}
\]

(b) \[
\begin{align*}
\text{HBr} & \quad \rightarrow \\
\text{Br} & \quad + \\
\text{Br} & \quad \text{major}
\end{align*}
\]

6. Consider the following two reactions. The first is the hydration reaction where the alkene is converted to an alcohol. The second is a related reaction where the alkene is converted to an ether. Write mechanisms for both reactions. Remember that alcohols are like water and will react similarly.

(a) \[
\begin{align*}
\text{C}_6\text{H}_{12} & \quad \text{H}_2\text{SO}_4 \quad \text{H}_2\text{O} \\
\text{C}_6\text{H}_{12} & \quad \text{OH}
\end{align*}
\]

(b) \[
\begin{align*}
\text{C}_6\text{H}_{12} & \quad \text{H}_2\text{SO}_4 \quad \text{CH}_3\text{OH} \\
\text{C}_6\text{H}_{12} & \quad \text{OCH}_3
\end{align*}
\]