1. Name the following compounds using IUPAC rules (including precedence).
   a.
   \[
   \begin{array}{c}
   \text{H}_2\text{C} = \text{CHCH}_2\text{CH}_2\text{CHOH} \\
   \text{CH}_3
   \end{array}
   \]
   b.
   \[
   \begin{array}{c}
   \text{HO} - \text{Cyclic structure} - \text{CH}_2\text{CH}_3
   \end{array}
   \]

2. Draw structures for the following IUPAC-named compounds.
   a. *cis*-3-methyl-2-pentenal
   b. meso-2,3-butanediol
3. Give the major product(s) of the following reactions:

a. 

b. 

c. 
4. Show the **mechanism** and **predict** the major product of the following two-step process (the 1) and 2) refer to the order of the reagents added; assume that these reagents are added stepwise, and that there is no mixing between these reagents. Pay attention to stereochemistry, as needed.

\[
\begin{align*}
\text{HC} &= \text{C} \\
\text{1) one equiv. of HCl} &
\end{align*}
\]

\[
\begin{align*}
\text{2) one equiv. of Br}_2 \\
in \text{CH}_2\text{Cl}_2
\end{align*}
\]
5. The following reactions are **stereoselective**. Using cis-trans drawings, or dash-wedge drawings, predict the major product:

a. 
\[
\text{C}_6\text{H}_5\text{C}≡\text{CC}_6\text{H}_5 \xrightarrow{\text{H}_2} \]
\text{Pd–Pb (Lindlar catalyst)}

b. 
\[
\begin{array}{c}
\text{Cl} \\
\text{C–C–C–C–C}
\end{array} \xrightarrow{\text{H}_2} \]
\text{25°C, Pt/C}

c. 
\[
\text{Cl} \xrightarrow{\text{HCl}}
\]

d. 
\[
\text{Cl}_2 \xrightarrow{\text{CH}_2\text{Cl}_2}
\]