"You got to be very careful if you don't know where you're going, because you might not get there."

-- Yogi Berra

1. (5 points) Using Newman projections, draw the following molecule in its LEAST stable conformation with respect to the bond indicated:

   **2,2,4-trimethylpentane, C3-C4 bond**

2. (10 points) Draw the structural formulas for **five** of the constitutional (or structural) isomers of C₇H₁₆.
3. (10 points) Draw two or three resonance forms for each of the following species. Indicate the major contributor or contributors to the hybrid in each case.
   a. O₃ (OOO) also known as ozone

   b. 
   ![Resonance Form](image)

4. (15 points) Provide the systematic name for each of the following compounds:
   a. 
   ![Structural Formula](image)
   b. 
   ![Structural Formula](image)
   c. 
   ![Structural Formula](image)
5. (10 points) Draw the structural formulas for all possible radical monobromination products that could be formed in the reaction bromine with decalin. Specify whether the alkyl bromide is primary, secondary, or tertiary.

6. (15 points) Complete the following acid-base reactions using curved arrows to show the flow of electrons and label which starting material is the acid and which is the base.

a. 

\[ \text{H}_2\text{O} + \text{H}^+ \rightarrow \]

b. 

\[ \text{H}_2\text{O} + \text{OH}^- \rightarrow \]

c. 

\[ \text{CH}_2^+ + \text{Br}^- \rightarrow \]

d. 

\[ \text{NH}_2 + \text{AlCl}_3 \rightarrow \]
7. (15 points) Provide the structural formula for each of the following compounds:
   a. 2,3,4-trimethyl-4-propyloctane

   b. \textit{trans}-1,2-Diethylcyclohexane

   c. 1-chloro-3,3-dimethylcyclobutane

8. (20 points) Draw the \textit{cis} isomer of 1-(1-methylethyl)-3-methylcyclohexane; then, flip the ring and redraw the molecule. \textbf{Circle} the most stable conformer for the \textit{cis}-isomer. Draw the \textit{trans} isomer of 1-(1-methylethyl)-3-methylcyclohexane; then, flip the ring and redraw the molecule. \textbf{Circle} the most stable conformer for the \textit{trans}-isomer. Which of the four conformers is most stable overall? Draw a \textbf{square} around the overall most stable conformer.

\textit{Cis isomer}

\textit{Trans isomer}
Bonus. (5 points) Where is the highest point in the United States east of the Mississippi River? If you can only name the state you get three points.