Multiple Choice Questions: Circle the single best answer. No penalty for guessing.

1. Name the compound \( \text{CH}_3\text{CH}=\text{CHCH}(\text{CH}_3)\text{CH}_2\text{CH}_3 \). (4 points)
   - A) 3-ethylhexane
   - B) 4-methylpentane
   - C) 4-methyl-2-hexene
   - D) 5-ethyl-1-pentene
   - E) hexenol

2. Name the compound \( \text{CH}_3\text{CH(OH)C(CH}_3)_2 \). (4 points)
   - A) 3-methyl-2-butanol
   - B) 3-pentanal
   - C) 1-methyl-4-butene
   - D) 5-ethyl-1-pentene
   - E) cyclobutanol

3. Which of the following compounds is most likely to be soluble in water? (4 points)
   - A) hexane
   - B) benzene
   - C) tripropylamine
   - D) 3-nonanol
   - E) 1,3,5-hexatriol

4. What element is most characteristic of a thiol? (4 points)
   - A) carbon
   - B) nitrogen
   - C) oxygen
   - D) sulfur
   - E) chlorine

5. Which of the following will have the highest boiling point? (4 points)
   - A) 1,3-propadiol
   - B) methane
   - C) methanal
   - D) ethene
   - E) cyclopentane

6. Draw three different isomers with the formula \( \text{C}_6\text{H}_{12}\text{O} \). (12 points)
7. Draw the structure of a molecule (your choice) that is **unsaturated** and has an **alcohol** functional group (be sure to indicate all atoms including hydrogen). (8 points)

8. Draw the structure and give the IUPAC name which results when HBr is reacted via a Markovnikov-type addition to cis-3-ethyl-2-hexene (CH₃CH=C(C₂H₅)CH₂CH₂CH₃). (8 points)

9. For the following molecule identify the numbered functional groups/structures. (10 points)
10. Draw the most probable product (dehydration) and give the IUPAC name when 3-heptanol (which has the formula \( \text{CH}_3\text{CH}_2\text{CH(OH)}\text{CH}_2\text{CH}_2\text{CH}_3 \)) is heated to high temperature. (8 points)

11. Draw the product when 3-heptanol (same starting reagent as problem 10) is oxidized completely. (8 points)

12. Draw the hemiacetal product formed when the aldehyde (C1) carbon reacts with the C5 alcohol group in glucose, \( \text{C}_6\text{H}_{12}\text{O}_6 \) (structure shown below). (6 points)