Directions (1-9): Predict the product(s) for the following reactions based on the appropriate mechanism. Indicate their relative quantities if more than one organic product is formed – major / minor / numerical order (if needed). Assume a single dominant mechanism except as noted.

1. \[
\text{Br} \quad \text{NaCN} \quad \text{DMSO}
\]

2. \[
\text{Br} \quad \Delta \quad \text{ONa} \quad \text{OH}
\]

3. \[
\text{ONa} \quad \text{OH}
\]

4. \[
\Delta \quad \text{ONa} \quad \text{OH}
\]
5. \[
\text{OH}
\]
\[
\text{H}_2\text{SO}_4 \text{ (conc.)} \xrightarrow{\Delta}
\]

6. \[
\text{Cl}
\]
\[
\text{Cl}
\]
\[
\text{NaNH}_2 \text{ (3 equiv)} \xrightarrow{\text{Liq. NH}_3} \text{NH}_3\text{Cl}_3\text{(aq)}
\]

7. \[
\text{I}
\]
\[
\text{ONa}
\]
\[
\text{OH}
\]

8. \[
\text{I}
\]
\[
\text{tert-BuO}^-\text{K}^+
\]
\[
\text{tert-BuOH}
\]

9. Two mechanisms compete strongly for #9:

\[
\text{I}
\]
\[
\text{NaOMe}
\]
\[
\text{MeOH}
\]
10. Draw the structure for the following compound:

(E)-3-bromo-4-methylhept-3-ene

11. Suggest a 5-carbon alkyl halide and appropriate conditions to generate the following alkene as the MAJOR product of an elimination.

12. Suggest an alkyl halide and an alkyne - each of 6 carbons or less – that could be used to synthesize the following compounds. Provide other necessary conditions as well.