Question 1 (12 pts.) Give the IUPAC name for the following compound. Be sure to use cis/trans, E/Z or R/S where appropriate.

```
\begin{center}
\includegraphics[width=0.2\textwidth]{compound1.png}
\end{center}
```

Question 2 (18 pts). Which is the stronger Bronsted acid, A or B (ignore keto-tautomers). Give a BRIEF explanation and support your assignment using appropriate drawings of the conjugate base anions.

```
\begin{center}
\includegraphics[width=0.4\textwidth]{compounds.png}
\end{center}
```
Question 3 (36 pts.) For each reaction on this page, provide the missing major organic product or reagents/conditions as appropriate, and state whether the reactions are Addition, Elimination, Substitution or Rearrangement and whether they are Reduction, Oxidation or Neither unless otherwise requested.

a) 
\[
\begin{align*}
\text{HO} & \quad \text{Excess PCC/CH}_2\text{Cl}_2 \\
\end{align*}
\]

b) 
\[
\begin{align*}
\text{Br} & \quad \text{1. HBr/ROOR} \\
& \quad \text{2. Na}^+ - \text{OH} \\
& \quad \text{3. Na}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4/\text{H}_2\text{O} \\
\end{align*}
\]
(ignoring addition/elimination etc and also oxidation/reduction)

c) 
\[
\begin{align*}
\text{1. HBr/ROOR} \\
\text{2. Na}^+ - \text{OH} \\
\text{3. Na}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4/\text{H}_2\text{O} \\
\end{align*}
\]
(ignoring addition/elimination etc and also oxidation/reduction)

d) 
\[
\begin{align*}
\text{1. Excess NaNH}_2/ \text{heat} \\
\text{2. H}_2\text{O} \\
\text{3. 1 Equiv. HBr} \\
\end{align*}
\]
(ignoring addition/elimination etc and also oxidation/reduction)

5 pts Extra Credit. Organic metals can be made by polymerizing:...

- epoxides
- alkynes
- alcohols
- alkenes
Question 4 (24 pts.) For (2R)-bromo-(3R)-methylpentane, draw a Lewis structure with wedged/dashed bonds with proper stereochemistry, draw a 3D/sawhorse structure AND a Newman projection of the conformation that would undergo E2 elimination, AND give the alkene that would be formed in an E2 elimination reaction.

Question 5 (14 pts.) For synthesis of the structure below
1) decide which would be the best bond to make in an SN2 reaction
2) perform retrosynthetic analysis on the bond you want to make and give the synthons
3) give the synthetic equivalents to perform the SN2 reaction, assign each one as a Lewis acid or Lewis base, and give the curved arrow pushing showing bond formation.
Question 6 (36 pts.) Show how you would synthesize the target compounds on the right from the starting compounds on the left. Show reagents and conditions, and the structures of important intermediate compounds. Do not show any (arrow pushing) mechanisms.

a) 

\[
\text{starting compound} \quad \rightarrow \quad \text{target compound}
\]

b) 

\[
\text{starting compound} \quad \rightarrow \quad \text{target compound}
\]
Question 7 (35 pts). Give a curved arrow pushing mechanisms for the following two reactions.

1) Add non-bonding electrons and C-H bonds to the line-angle structures as required.

2) Indicate the Lewis acid/Lewis base (LA, LB) at each INTERMOLECULAR step as appropriate, and whether they are also Brønsted acids/bases (LA/BA, LB,BB).

3) GIVE THE NUMBER OF STEPS IN YOUR MECHANISM

a) 

\[
\begin{align*}
\text{HO} & \quad \text{H}_2\text{SO}_4 \text{ cat.} \\
\text{H}_2\text{O} & \quad \rightarrow \\
\text{O} & 
\end{align*}
\]

b) 

\[
\begin{align*}
\text{OH} & \quad \text{conc. H}_2\text{SO}_4 \text{ heat} \\
\text{heat} & \quad \rightarrow \\
\text{OH} &
\end{align*}
\]