YOU MUST COMPLETE THIS PAGE WITH YOUR NAME
(EVEN THOUGH YOU ALREADY DID THIS ON THE COVER PAGE)
AND ALSO GIVE YOUR ASU OR POSTING ID NUMBER
WE NEED THIS NUMBER BECAUSE YOU WOULDN'T BELIEVE THE NUMBER OF
STUDENTS WHOSE NAMES WE CAN'T READ!

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Points by question
1____________/14
2____________/22
3____________/31
4____________/14
5____________/20
6____________/36
7____________/38

Points Removed for cover errors ___/2

Extra Credit_____/5

Total (incl Extra)______/175+5

**YOU ARE NOT ALLOWED TO TAKE SPARE COPIES OF THIS EXAM FROM THE TESTING ROOM**
Question 1 (14 pts.) Give the IUPAC name for the following compound. Be sure to use cis/trans, E/Z or R/S where appropriate.

Question 2 (22 pts.) Which is the stronger Brønsted acid, A or B? Give a BRIEF explanation that includes drawings of ALL IMPORTANT resonance contributors of the conjugate base anions. Your explanation MUST include the following terms: "electron donating", "electron withdrawing", "resonance" "inductive effect", and also mentions BASE STRENGTH.
Question 3 (first part, 15 pts.) For each reaction
1) Provide the missing **reagents/conditions**
2) **State** whether each reaction is an Addition, Elimination, Substitution or Rearrangement
3) **State** whether each reaction is Reduction, Oxidation or Neither

a) \[
\begin{align*}
&\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{OH} \quad (\pm) \\
\rightarrow &\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{Br} \quad (\pm)
\end{align*}
\]
*(you do not need to assign oxidation or reduction for this problem)*

b) \[
\begin{align*}
&\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{O} \quad (\pm) \\
\rightarrow &\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{OH} \quad (\pm)
\end{align*}
\]

Question 3 (second part, 16 pts.) Give the major organic product of the following reactions
**DO NOT STATE** whether the reaction is Addition/Elimination/Substitution/Rearrangement
**DO NOT STATE** whether each reaction is reduction/oxidation/neither

- [c) \[
\begin{align*}
&\text{CH}_3-\text{CH}_2-\text{CH}≡\text{CH} \quad \text{Na/NH}_3(\text{l}) \\
\rightarrow &\text{CH}_3-\text{CH}_2-\text{C}≡\text{C}-\text{Na}\
\end{align*}
\]
- [d) \[
\begin{align*}
&\text{CH}_3-\text{CH}≡\text{CH}≡\text{CH} \quad 1 \text{ Equiv. HBr} \\
\rightarrow &\text{CH}_3-\text{CH}≡\text{CH}≡\text{C}-\text{H}\
\end{align*}
\]

5 pts Extra Credit. Which functional group can be polymerized to form an organic metal?
- alcohol
- alkene
- alkyne
- epoxide
Question 4 (14 pts). Perform retrosynthetic analysis for the bond indicated by the dashed line in the target structure below, generate the best synthons and also the synthetic equivalents. Give the curved arrow pushing for the synthetic equivalents showing bond making/breaking and label them as Lewis acid and Lewis base as appropriate.

Question 5 (20 pts.) For the following structure:
1. Decide which of the bonds A and B it is possible to make in an SN2 reaction
2. Indicate which bond this is, and give:
   · a complete reagents/conditions (you can choose whichever leaving group you like)
   · the curved arrow pushing showing bond making/breaking
   · assign the Lewis acid and base, as appropriate
3. Briefly state why the other bond (A or B) cannot be made.

Bond ___ can be made as follows:

The problem with making bond ___ is:
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)  

b)
Question 7 (38 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) Include ALL IMPORTANT RESONANCE CONTRIBUTORS for intermediates
4) GIVE THE NUMBER OF STEPS IN YOUR MECHANISMS

a)  

b)