1. (12 points, 6 minutes)

1a. Determine the R or S configuration of the molecule shown below. Clearly number the priority of each group.

1b. Give the IUPAC name of this molecule.

\[(\alpha R)-1\text{-bromo-3-methyl-2-phenyl but-3-ene-2-ol}\]

2. The following acid base reaction is known to go the right. (6 points, 3 minutes)
Label all acids and bases in the reaction and circle the stronger base.

\[
\text{acid} \quad \text{acid}
\]

\[
\text{base} \quad \text{base}
\]

\[
\text{CH}_3\text{C}≡\text{CH} + \text{NH}_2^- \quad \rightarrow \quad \text{CH}_3\text{C}≡\text{C}^- + \text{NH}_3
\]
3. (16 points, 8 minutes)
   a. Indicate whether or not each of the following molecules is chiral.

   ![Chemical structures]
   chiral  
   chiral

   b. What is the relationship between these two molecules (identical, constitutional isomers, enantiomers or diastereomers)? You are not required to determine R or S.

   diastereomers

4. (20 pts, 10 minutes)
4a. Draw the least stable chair conformation of the following molecule.

   ![Chemical structure]

4b. Draw a Newman projection along the C1-C2 bond of your chair conformation and label all gauche interactions.

   ![Newman projection]
5. Give the mechanism for the following reaction. (16 points, 10 minutes)

6. Give the product or products of each of the following reactions. (6 pts each, 6 min each) Be sure to include stereochemistry and to show all products that form.

a. \[ \text{H}^+ / \text{MeOH} \rightarrow \text{products} \]

b. \[ 1. \text{Hg(OAc)}_2, \text{H}_2\text{O} \]
\[ 2. \text{NaBH}_4 \]

b. \[ \text{products} \]

c. \[ \text{OsO}_4 \rightarrow \text{products} \]

d. \[ 1. \text{BH}_3 \]
\[ 2. \text{OH}^-, \text{H}_2\text{O}_2 \]

e. \[ \text{Br}_2 / \text{H}_2\text{O} \rightarrow \text{products} \]