Chem 331
Fall 2011
Exam 1

Your Name______________________________
1. Draw the structure (5 points each)

\((2R,3S)-3\text{-ethyl}-2\text{-methylcyclohexanone}\) \((2R,4E)-2\text{-mercaptohex-4-en-1-ol}\)

2. Give IUPAC names for each molecule (5 points each)

\[
\begin{align*}
\text{Br} & \quad \text{O} & \quad \text{Cl} \\
\text{NH}_2 & \\
\end{align*}
\]
3. For each pair of structures, indicate if they are the same, enantiomers, or diastereomers. If the none of these terms accurately describe the molecules, then circle “none of the above”
(5 points each)

(a) \[ \text{same} \quad \text{enantiomers} \quad \text{diastereomers} \quad \text{none of the above} \]

(b) \[ \text{same} \quad \text{enantiomers} \quad \text{diastereomers} \quad \text{none of the above} \]

(c) \[ \text{same} \quad \text{enantiomers} \quad \text{diastereomers} \quad \text{none of the above} \]

(d) \[ \text{same} \quad \text{enantiomers} \quad \text{diastereomers} \quad \text{none of the above} \]
4. The reaction below produces two products, A and B

\[
\text{Br} \quad \text{H} \quad \text{O} \quad + \quad \text{Bu}_3\text{SnH} \quad \xrightarrow{\text{cat.} \quad \text{N}=\text{N}} \quad \text{CN} \quad \xrightarrow{\text{(AIBN)}} \quad \text{A} \quad \text{C}_{11}\text{H}_{20}\text{O} \quad + \quad \text{B}
\]

a. Provide a mechanism for the formation of A (8 points)
b. Provide a structure for B and a mechanism for its formation (12 points)

\[^{13}\text{C} \text{NMR of B}\]
- 64.9, t (2 carbons)
- 54.6, t
- 42.5, t
- 40.4, s
- 37.6, s
- 37.2, t (2 carbons)
- 28.3, q (2 carbons)
- 26.2, t
5a. Anion $A$ is more stable (lower in energy) than $B$—explain why?
Draw and compare resonance structures for $A$ and $B$ in support of your answer. It is NOT necessary for you to depict orbitals.

8 points

5b. Anion $A$ is more stable (lower in energy) than $C$—explain why?
Draw a clear orbital picture and less than 30 words to explain why.

12 points