3. Give the products of the following reactions including all stereoisomers and showing stereochemistry in 3-D.

(a) 

(b) 

(c) 

1. Give the starting material and reagents over the arrow for the following reactions. **No credit for hydrogenations.**

(a) 

(b) 

(c) 

2. Circle the alkyl halide which would undergo the most rapid $S_N2$ reaction with NaOCH$_2$CH$_3$.

- Br
- Br
- Br
- Br
- NaOCH$_3$
- CH$_3$OH
- NaOCH$_3$
- CH$_3$OH
- CH$_3$CH$_2$
- H
- Cl
- H
- Cl
- NaI
- O
- H
- CH$_3$OH
- OCH$_3$

4. Draw the mechanism of the following reaction showing all intermediates and electron-pushing arrows. Draw the transition state $\dagger$ of the rate-determining (slow) step.

2. 4. Draw the mechanism of the following reaction showing all intermediates and electron-pushing arrows. Draw the transition state $\dagger$ of the rate-determining (slow) step.