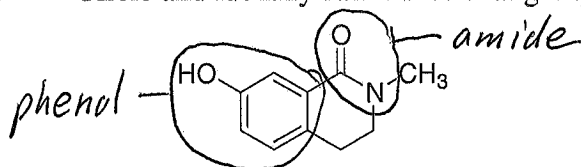
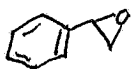


I. Nomenclature:

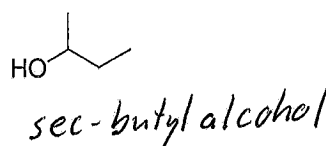
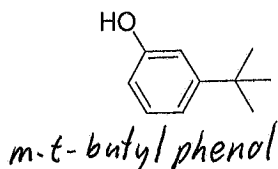
1. Circle and identify each functional group in the molecule below. (4 points)



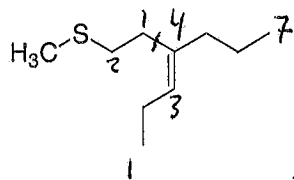
2. Draw a structure for styrene oxide. (3 points)



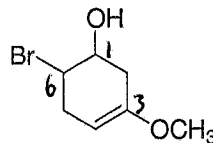
3. Provide common names for each of the following compounds. (6 points)



4. Using IUPAC rules, correctly name each structure below. Include terms used to describe configuration. (10 points)



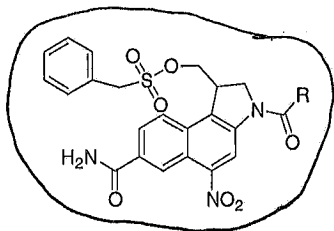
(Z) 4-(2-methylthioethyl)hept-3-ene



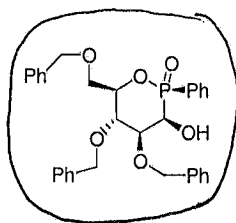
6-bromo-3-methoxycyclohex-3-enol

(not needed in this example)

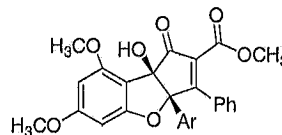
5. Circle all structures below that feature an inorganic ester. (3 points)



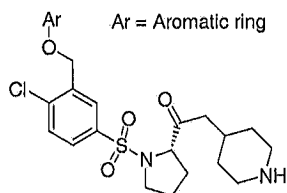
*J. Med. Chem. 2012, 2780
(anticancer agent)*



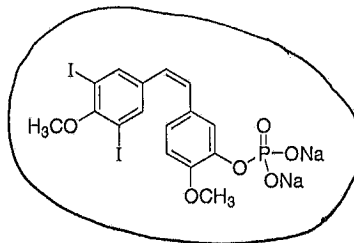
*J. Med. Chem. 2012, 2196
(Treats brain tumors)*



*J. Am. Chem. Soc. 2012, 6140
(cytotoxic agent)*



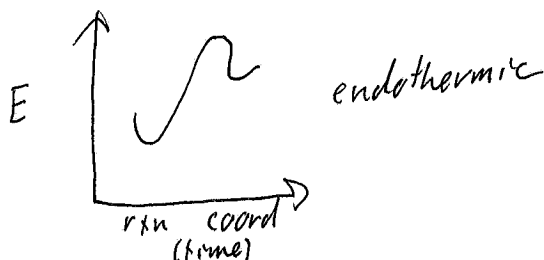
*J. Med. Chem. 2012, 2574
(Treats chronic pain/inflammation)*



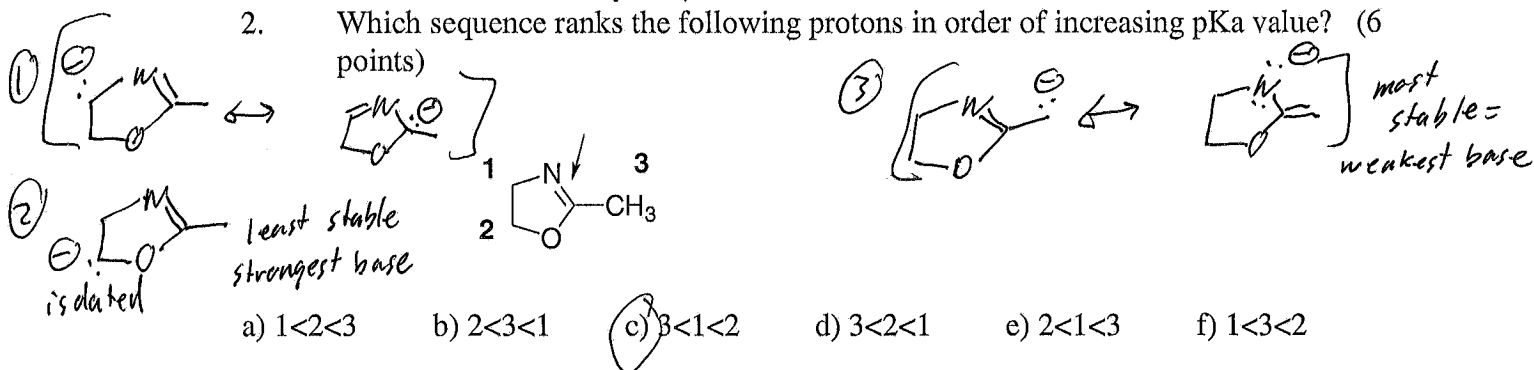
*J. Nat. Prod. 2012, 385
(treats thyroid cancer)*

II. Theory:

1. Provide an energy diagram of a one step reaction having a late transition state. Be sure to correctly label each axis. (6 points)

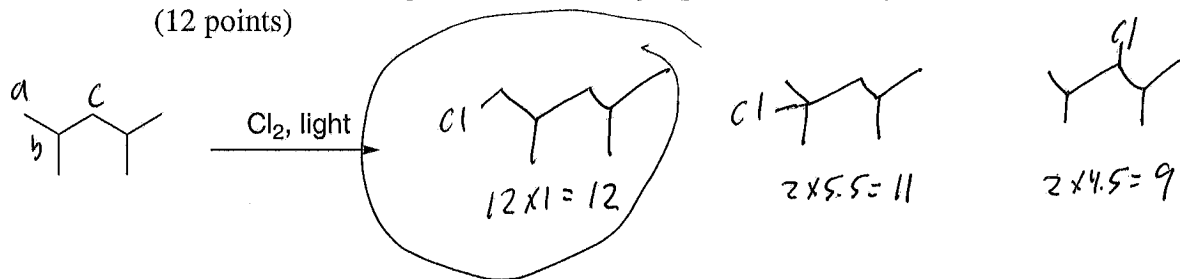


2. Which sequence ranks the following protons in order of increasing pKa value? (6 points)

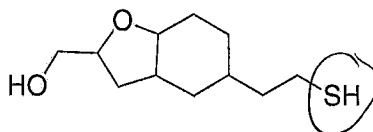


3. (Fill in the blank) In the question above, the indicated carbon nitrogen sigma bond is composed of overlap between an sp^2 hybridized carbon with an sp^2 hybridized nitrogen. (4 points)

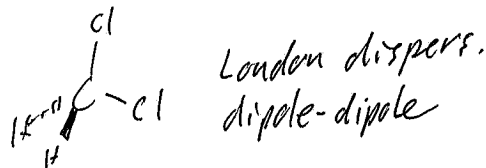
4. Draw all monochlorination products resulting from treating 2,4-dimethylpentane with chlorine and light. Circle the major product. Show your work for full credit. (12 points)



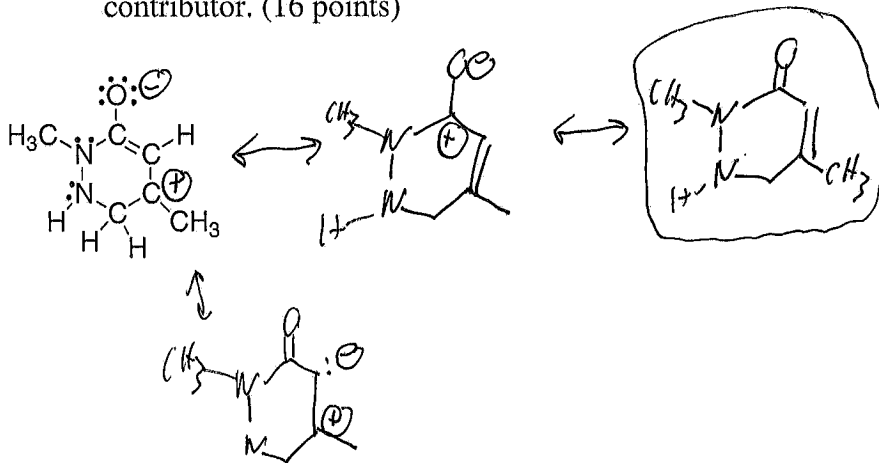
5. Circle the most nucleophilic atom in the following structure. (3 points)



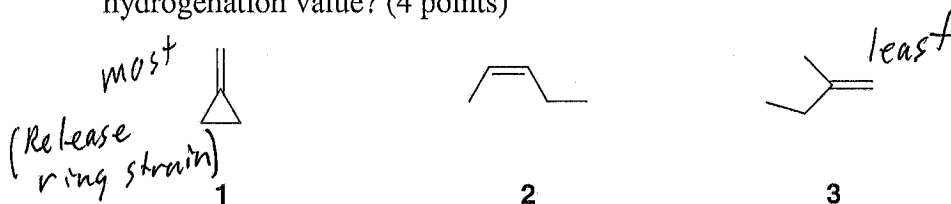
6. What intermolecular attractions exist in dichloromethane? (4 points)



7. Given that all electrons are represented, fill in any missing formal charges on the structure below. Then draw all significant resonance structures. Circle the major contributor. (16 points)



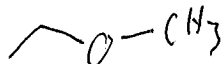
8. Which sequence ranks the following alkenes in order of increasing heat of hydrogenation value? (4 points)



- a) 1<2<3 b) 2<3<1 c) 3<1<2 **d) 3<2<1** e) 2<1<3 f) 1<3<2

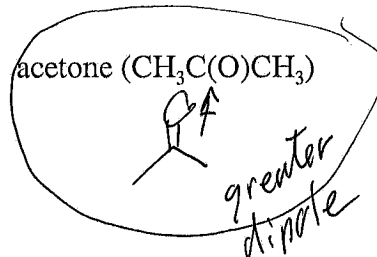
9. Circle the structure below that has the higher boiling point. (4 points)

ethyl methyl ether



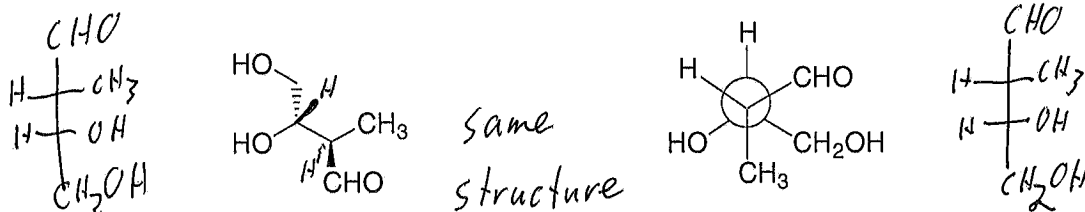
or

acetone ($\text{CH}_3\text{C}(\text{O})\text{CH}_3$)

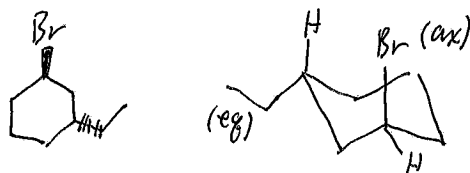


III. Conformations and Stereochemistry

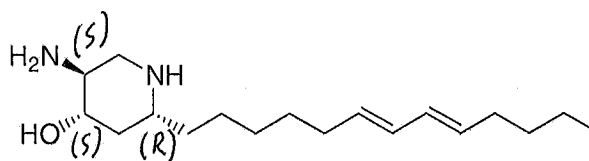
1. Label the following structures as being the same structure, enantiomers, diastereomers, or constitutional isomers. (6 points)



2. Draw (1R, 3R) 1-bromo-3-ethylcyclohexane in its most stable chair conformation. Label each substituent as being equatorial or axial. (6 points)



3. (+)-Pseudodistomin D is an alkaloid isolated from a marine sponge (*Org. Lett.* 2012, 1672). Label each chiral center as having *R* or *S* configuration. (12 points)



4. If a compound has a molecular formula of $C_{11}H_{17}O_3NBr_2$, how many degrees of unsaturation does it have? (4 points)

$$2(11) + 2 + \frac{N}{1} - \frac{Br}{2} - 2 = 23 \text{ H's max}$$

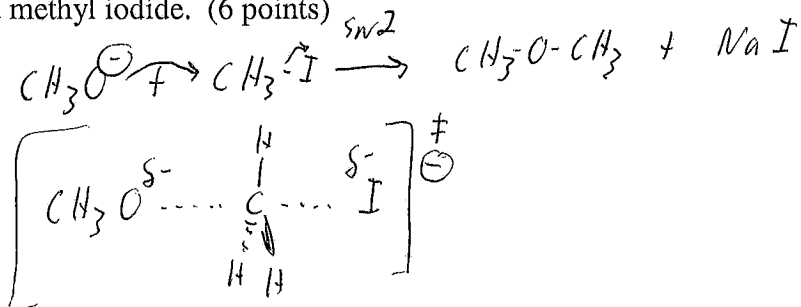
$$\underline{-17}$$

6 H's short

$$\frac{6}{2} = \underline{3^{\circ} \text{ unsat.}}$$

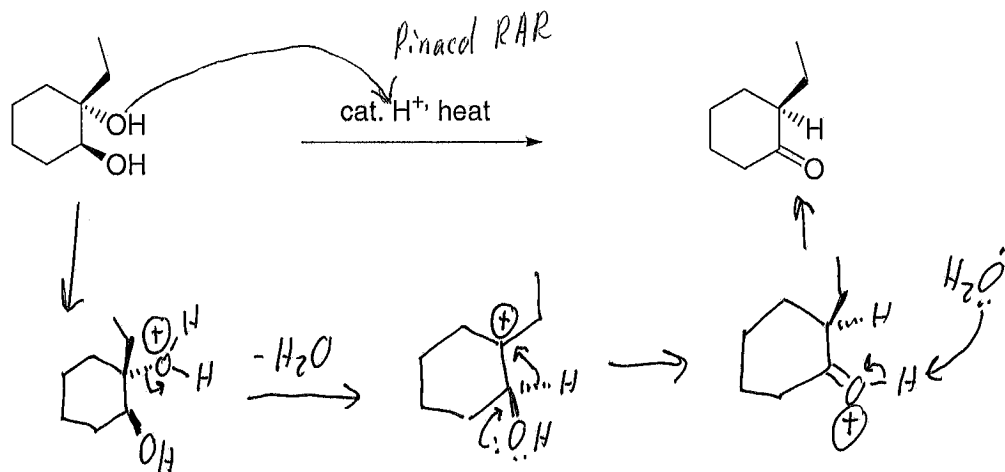
IV. Mechanism:

1. Provide a structure for the transition state in the reaction between sodium methoxide and methyl iodide. (6 points)

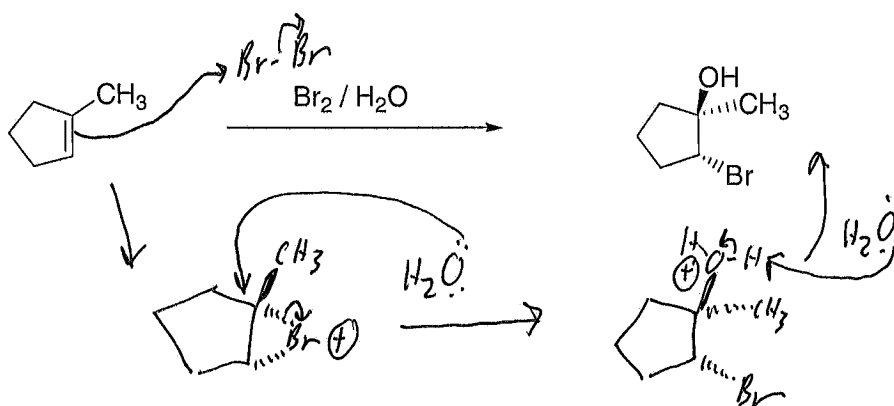


2. Provide an arrow-pushing mechanism for each of the following reactions below. Show all intermediates, and formal charges.

(12 points)

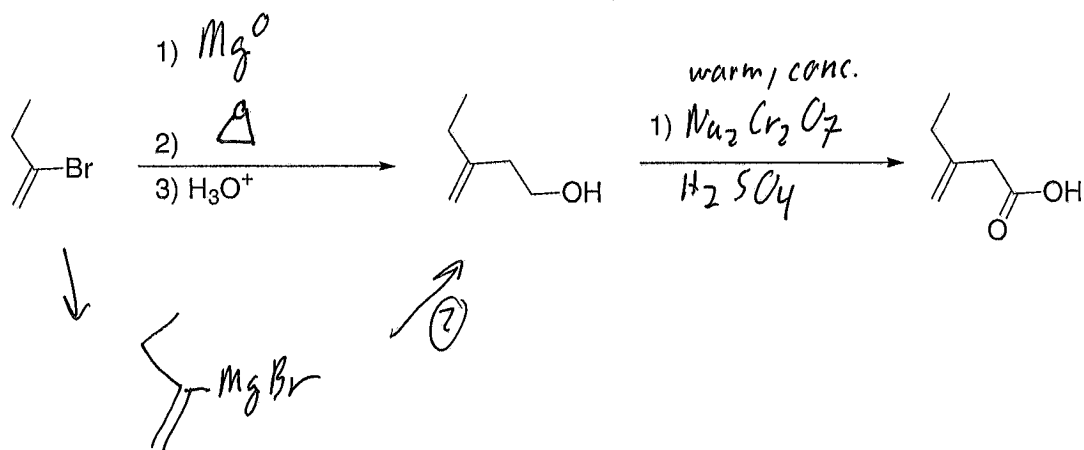


(10 points)

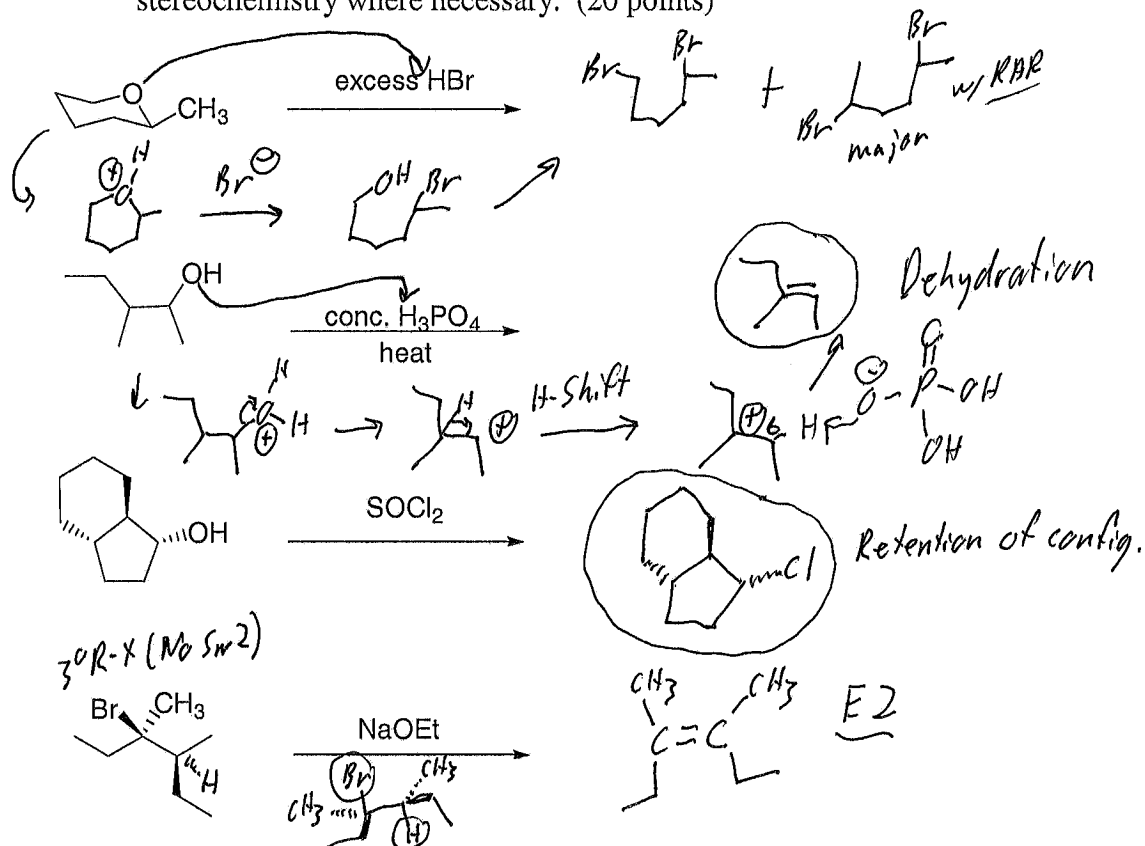


V. Reactions:

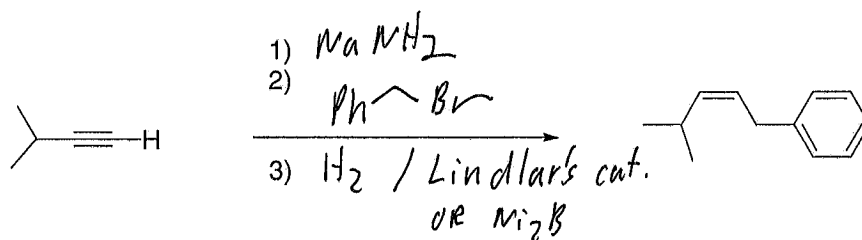
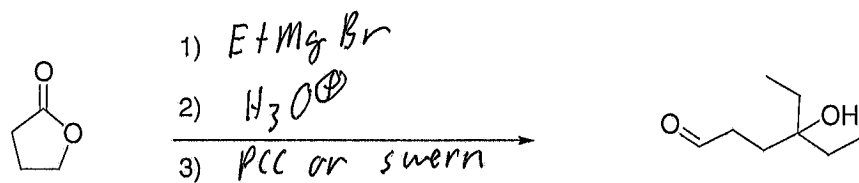
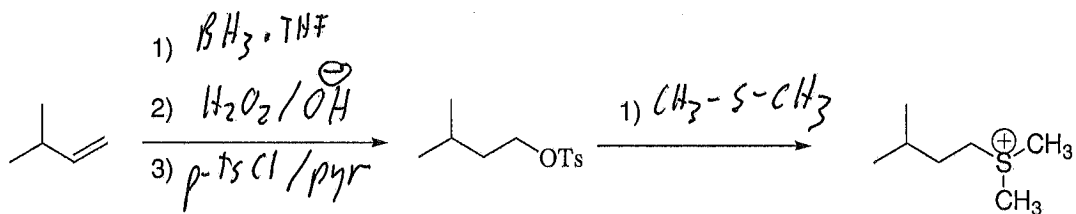
1. Complete the following reactions by filling in the necessary reagents. (9 points)



2. Complete the reactions below by filling in the major product. Show stereochemistry where necessary. (20 points)

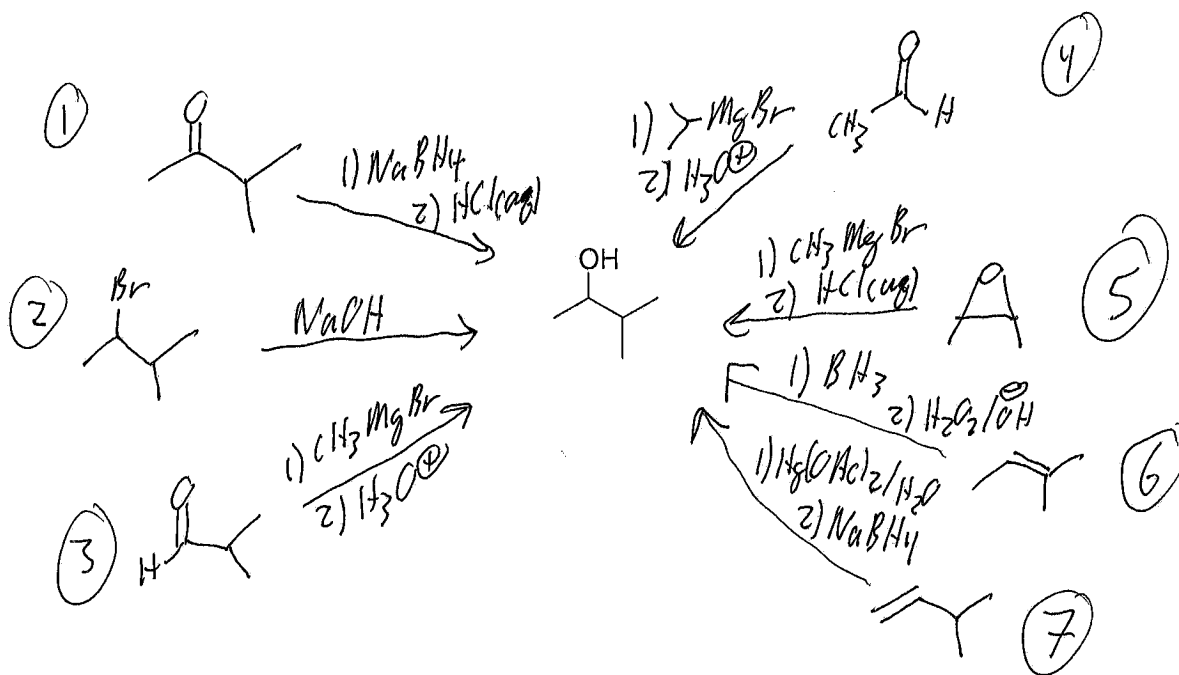


3. Complete each reaction below by filling in the missing reagents. (30 points)



VI. Extra Credit:

1. Provide 5 different methods of forming the following alcohol. (10 points)



You received _____ points out of 200 points possible. To check your overall performance in lecture see <http://canvas.weber.edu>.