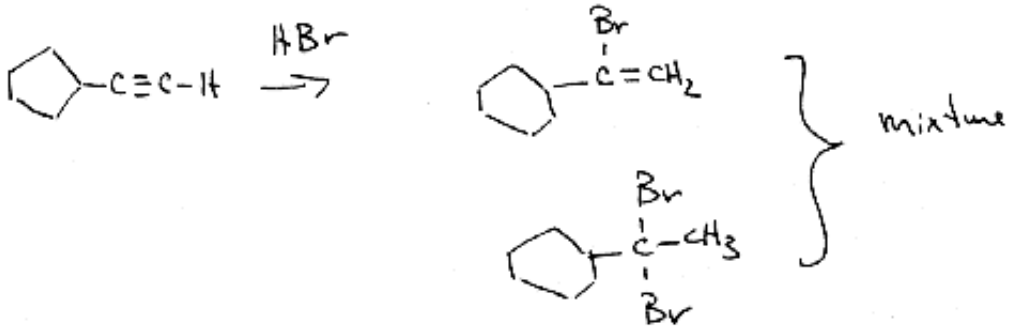
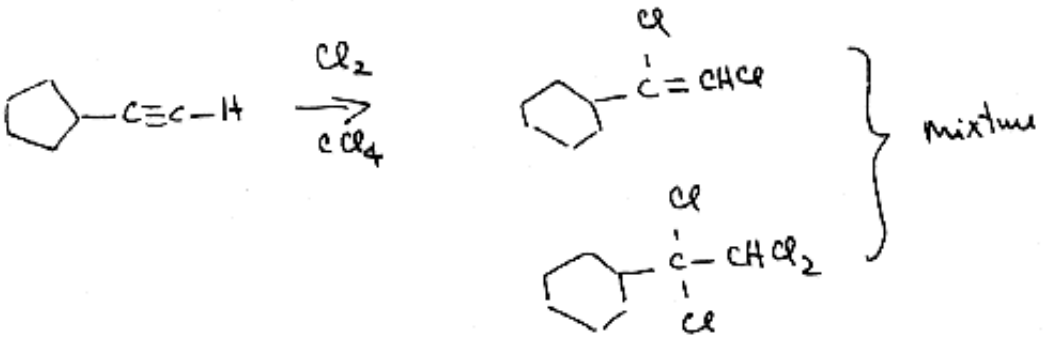
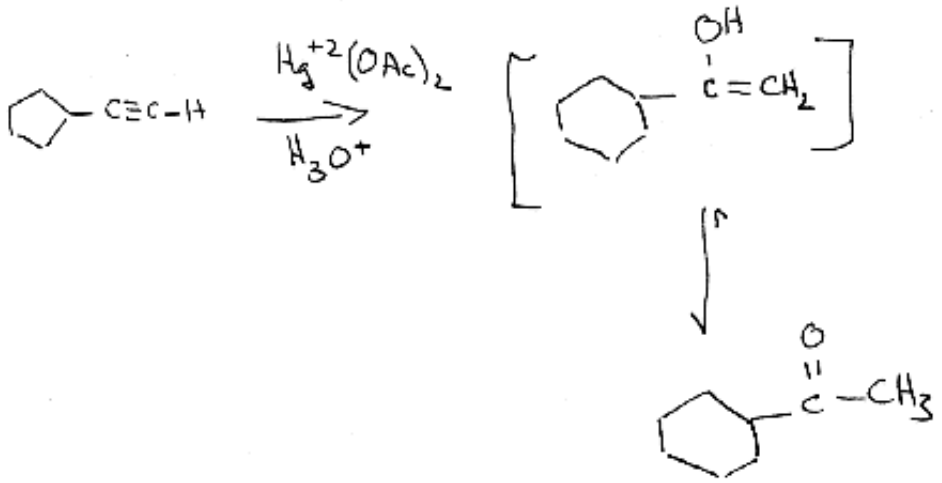
Chemistry 3311-100
Organic Chemistry/Dr. Barney Ellison
Friday: May 7.99 @ **07:30 → 10:30**/Final Exam/Chem 140

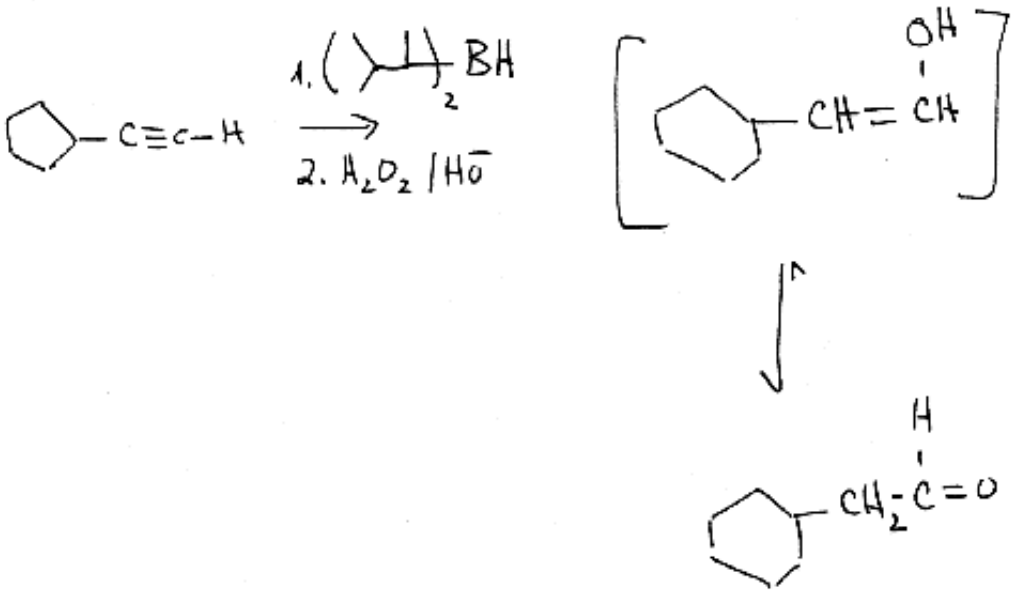
Name: key (please print)

1. (20 pts) What is the product of the reaction? [list the major products]

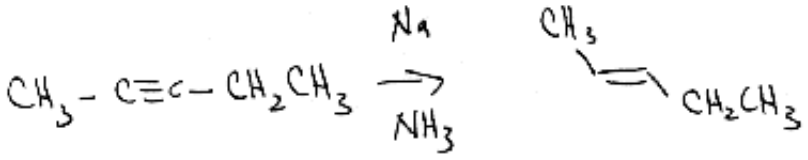


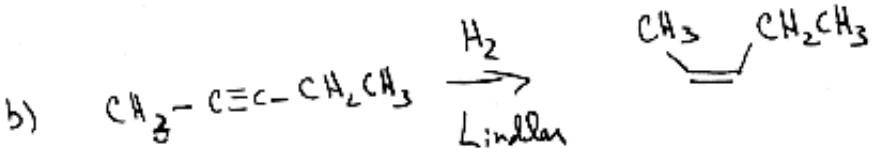



C≡C–H
$Hg^{+2}(OAc)_2$
H_3O^+
OH
C=CH2
O
C–CH3

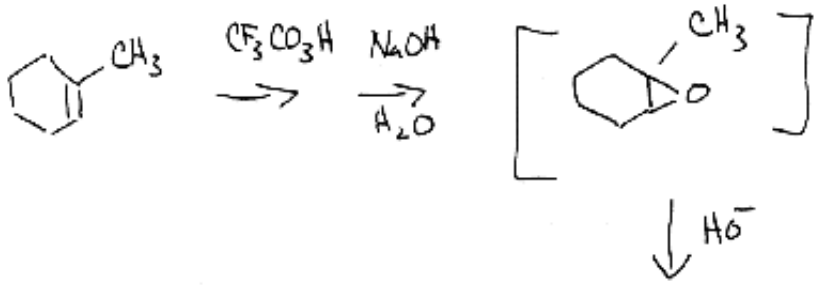

C≡C–H
1. ( )2 BH
2. H2O2 / HO⁻
OH
CH= CH
H
CH2-C=O

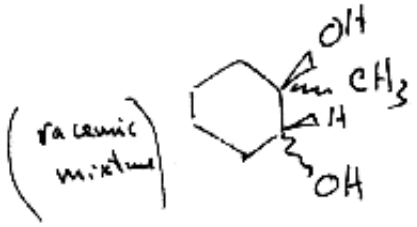
2. (10 pts) Carry out the following transformations.

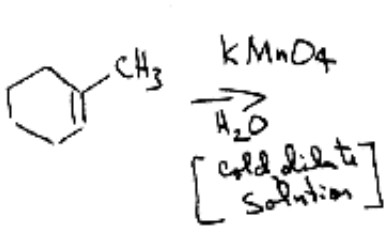
a) 

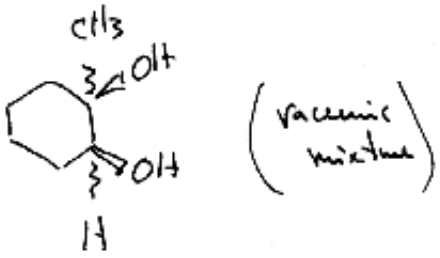
b) 

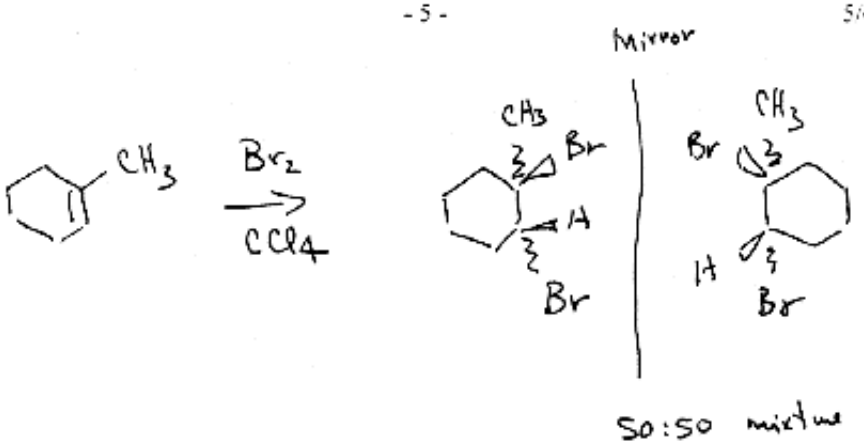
3. (20 pts) What is the product of the reaction?

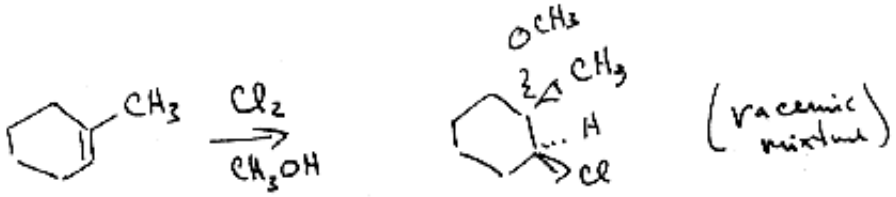




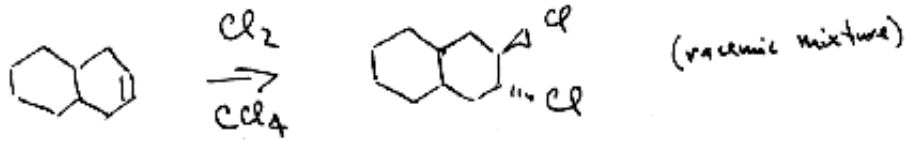




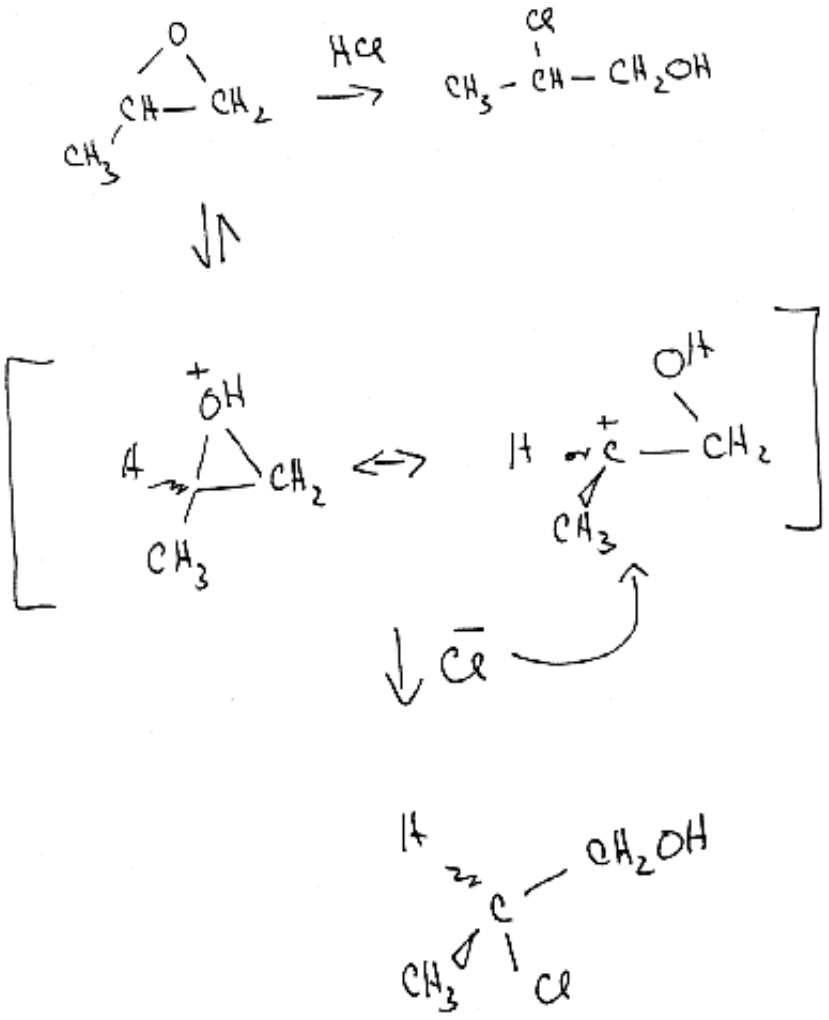

Mirror
CH3
Br2
CCl4
CH3
Br
H
Br
CH3
Br
H
Br
50:50 mixture


CH3
Cl2
CH3OH
OCH3
CH3
H
Cl
(racemic mixture)

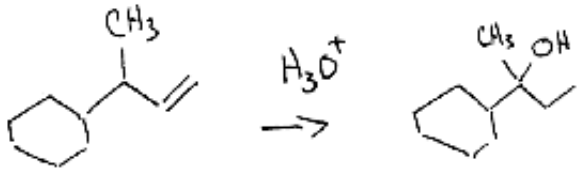
4. (10 pts) Carry out the following transformations

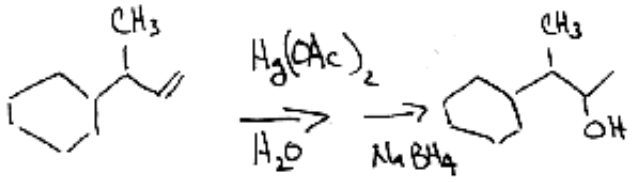


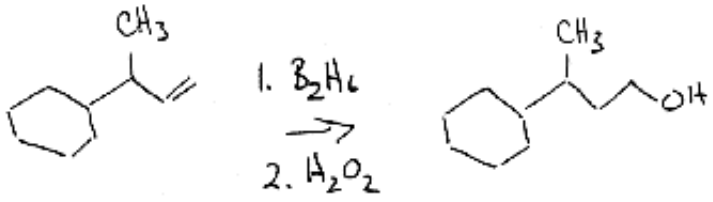
5. (10 pts) What is the mechanism for the following reaction?

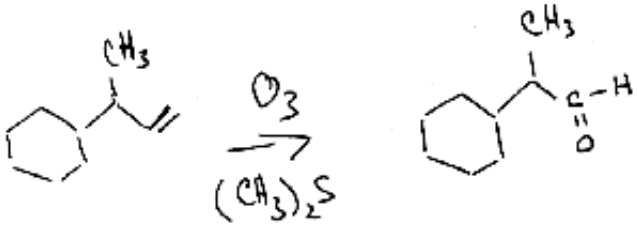


6. (20 pts) Carry out the following transformations.

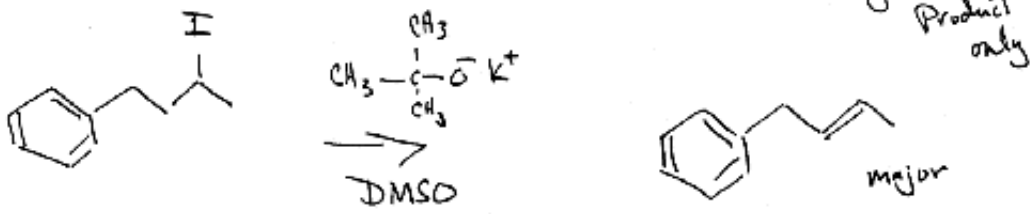





CH3
1. B2H6
2. H2O2
CH3
OH


CH3
O3
(CH3)2S
CH3
C
H
O

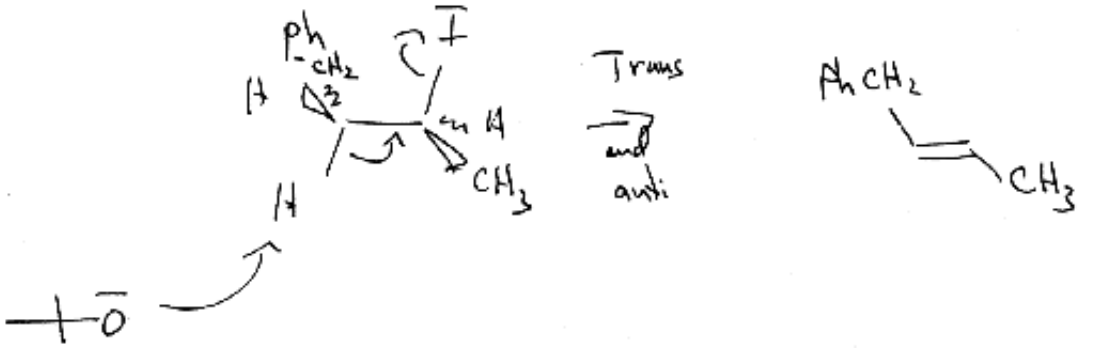
7. (10 pts) What is the product of this reaction? Write me a mechanism.



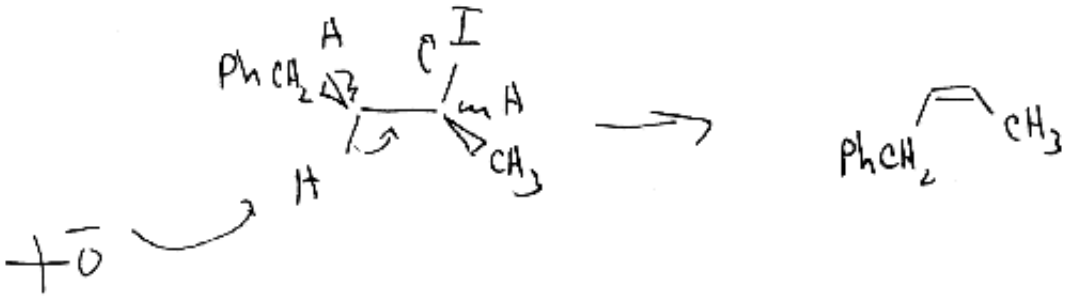
Saytzeff Product only

major + minor

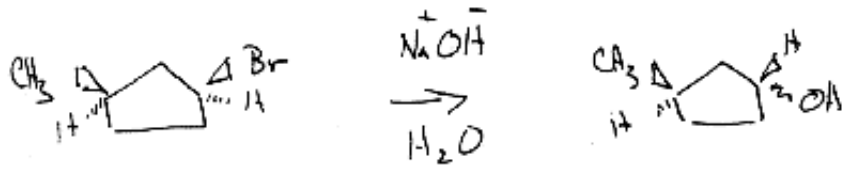
This is an E2 Rxn since the nucleophile is so hindered



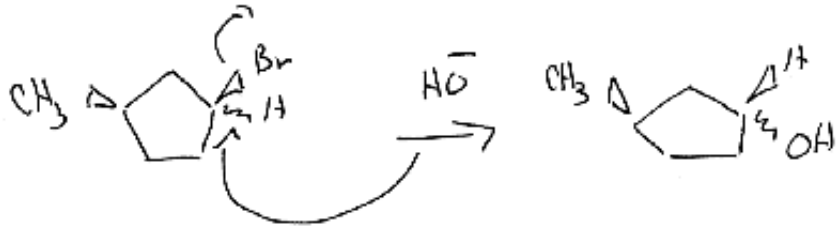
and



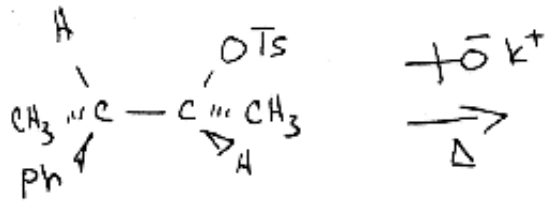
8. (10 pts) What is the product of this reaction? Write me a mechanism

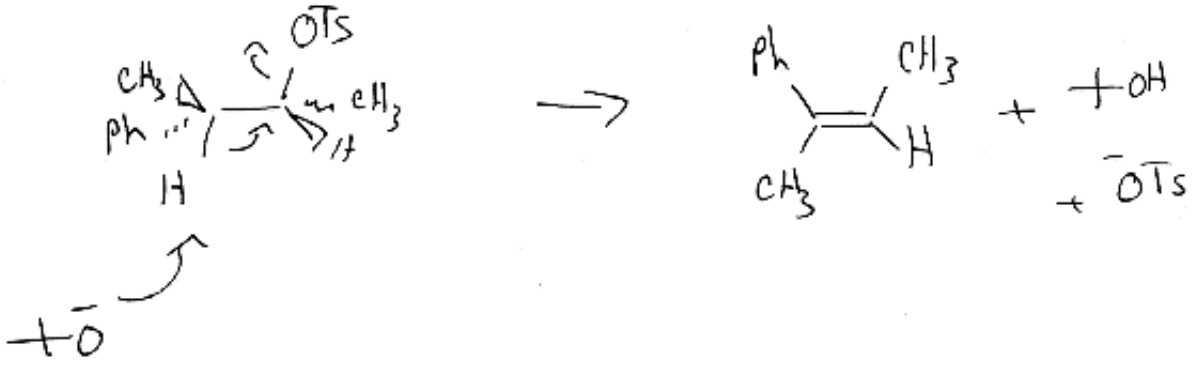


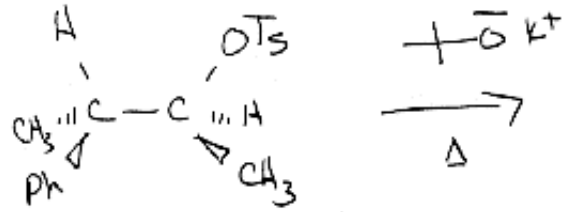
S_N2

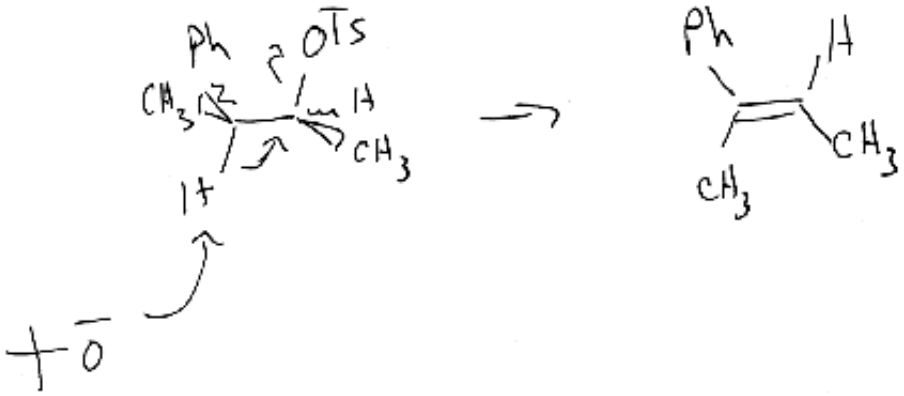


9. (20 pts) The tosylates below are subjected to E2 conditions. What are the reaction products? Write me a mechanism.

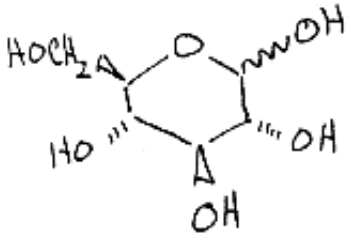


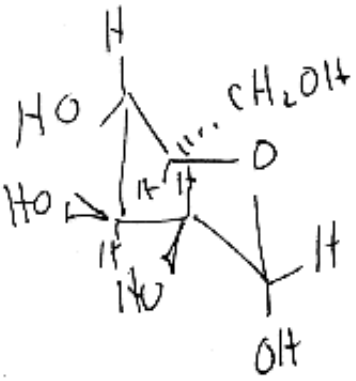



H
OTs
CH3
Ph
CH3
+ O⁻ K⁺
Δ

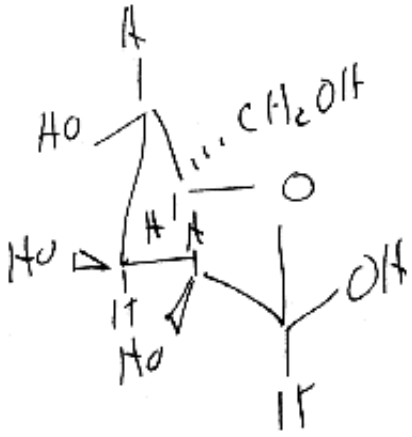

Ph
OTs
CH3
H
CH3
H
+ O⁻
Ph
H
CH3
CH3

10. (10 pts) The glucose molecule is sketched below. The squiggly bond merely means that the hydroxyl group at the 1-position can be up or down. That is there are two structures for glucose. Draw these two molecules in 3 dimensions.



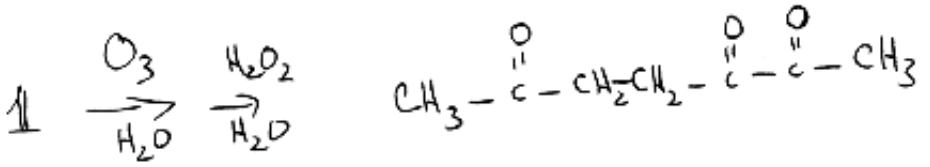


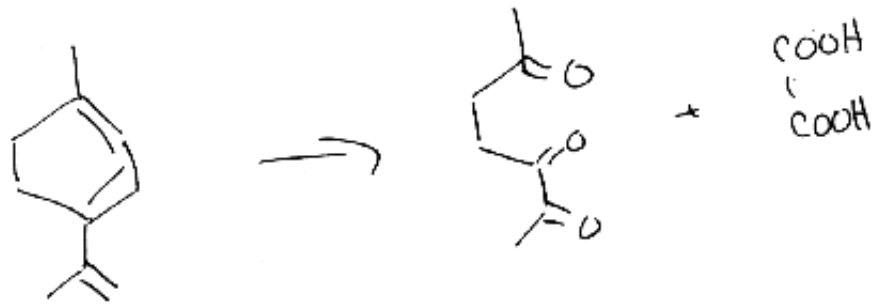
α glucose



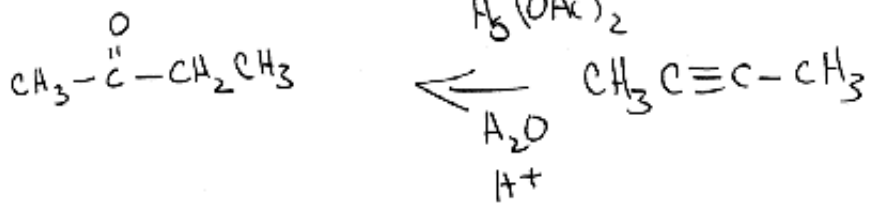
β glucose

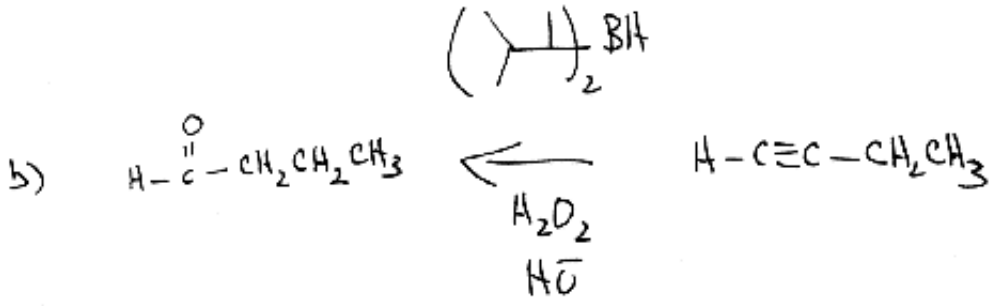
11 (10 pts) Compound **1** is treated with O_3 and then worked up with H_2O_2. The following products are isolated. When **1** is subjected to catalytic hydrogenation it is transformed into 1-isopropyl-4-methylcyclohexane. What is the chemical structure of **1**?



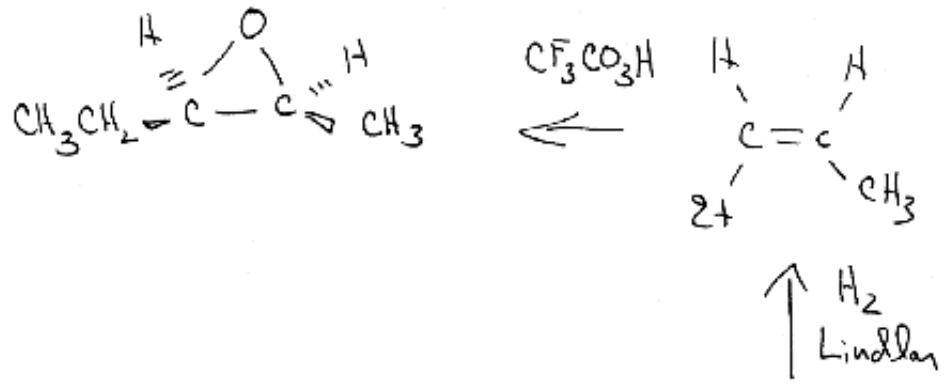


12. (20 pts) Provide syntheses for the following targets. You must use alkynes containing no more than 4 C atoms. Mechanisms are not required.

a) 

b) 

c)



$$CH_3CH_2-C\equiv C-H \xrightarrow{Na^+NH_2^-} CH_3CH_2C\equiv C^- \xrightarrow{CH_3Br} CH_3CH_2-C\equiv C-CH_3$$

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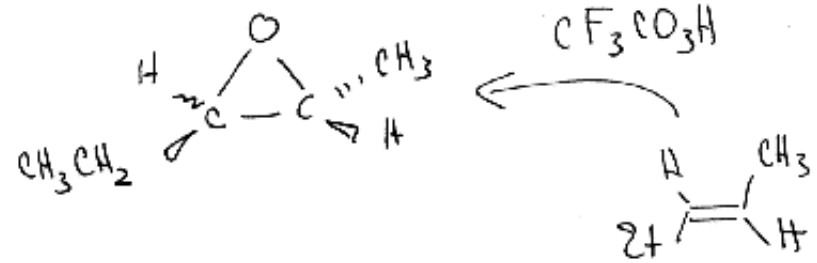
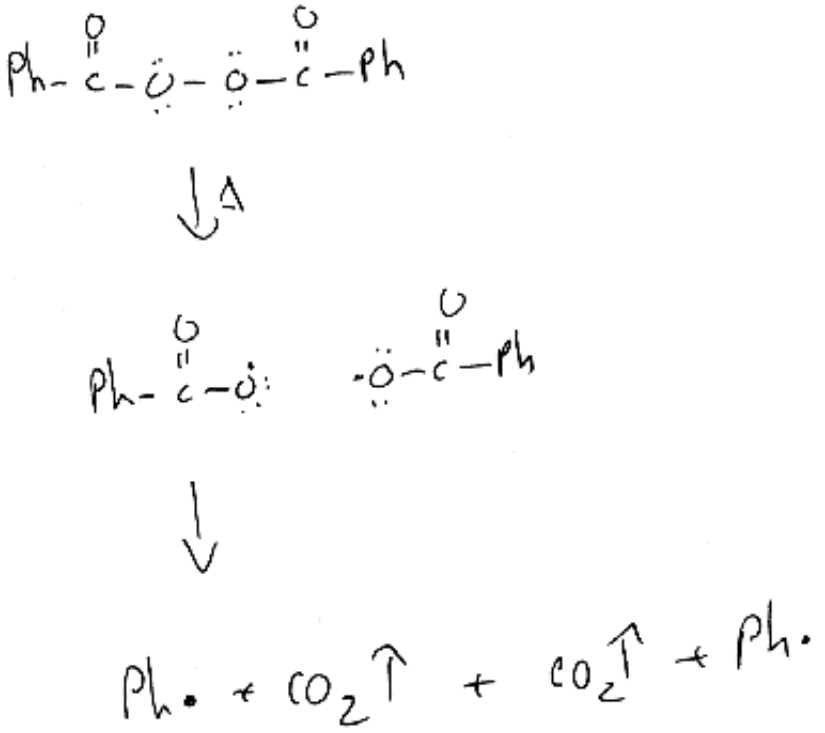
d)



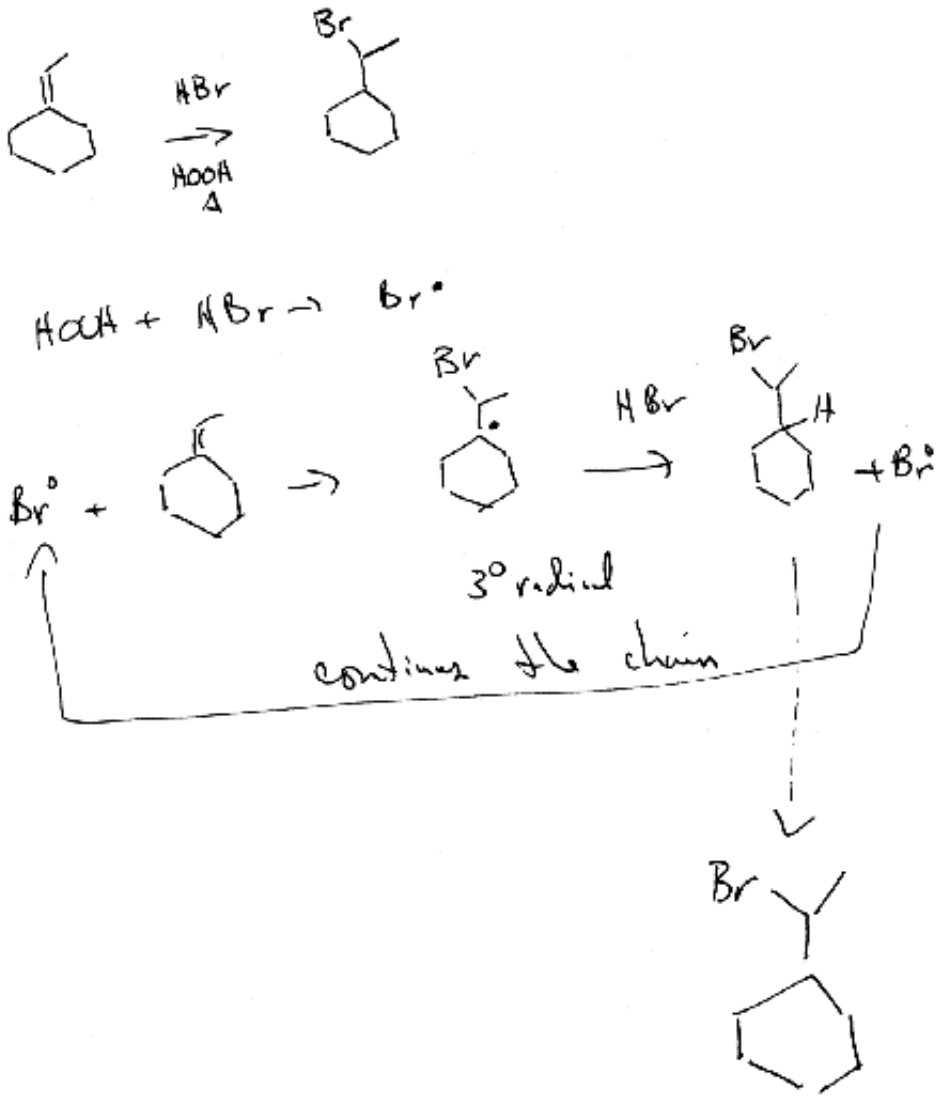
$$CH_3CH_2-C\equiv C-H \xrightarrow{Na^+NH_2^-} CH_3CH_2-C\equiv C^- \xrightarrow{CH_3Br} CH_3CH_2-C\equiv C-CH_3$$

13. (10 pts) Benzoyl peroxide, C_6H_5-CO_2-O_2C-C_6H_5, is a good radical initiator for many radical reactions. Upon heating to a moderate temperature, this acyl peroxide decomposes and generates a pair of phenyl radicals, C_6H_5. What is the mechanism for this decomposition?

$$C_6H_5\text{-}CO_2\text{-}O_2C\text{-}C_6H_5 + \Delta \rightarrow C_6H_5 + CO_2 + CO_2 + C_6H_5$$



14. (10 pts) What is the mechanism for the following reaction?



15. (10 pts) Explain the stereochemical results of the photochlorination of the optically active compound **2**. What is the configuration of **2**, R or S? Why does the reaction destroy the stereochemistry?