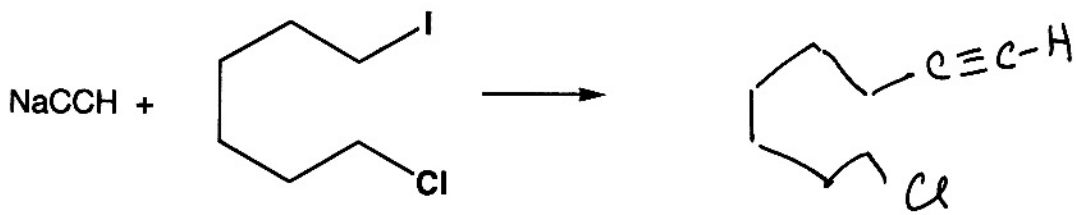
Chemistry 3311-100
Organic Chemistry / Dr. Barney Ellison
Thursday: April 17th @ **7:00pm → 9:00** / 3rd Exam / Math 100

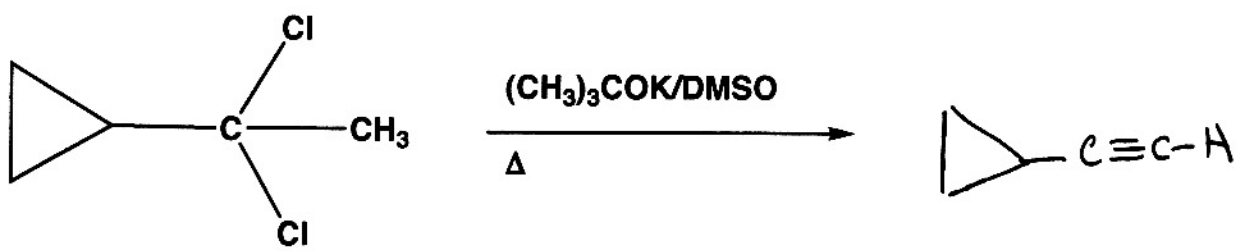
Name: Key (please print)

1. (20 pts) Predict the major organic product of each of the following reactions.

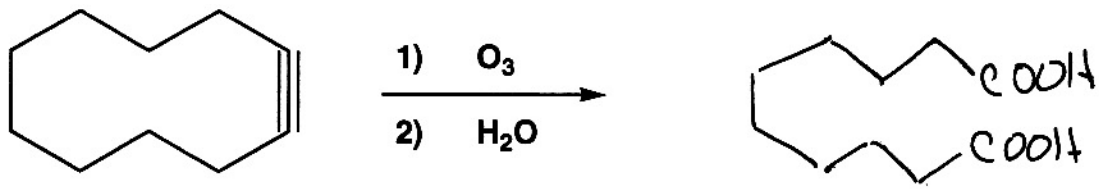
a)



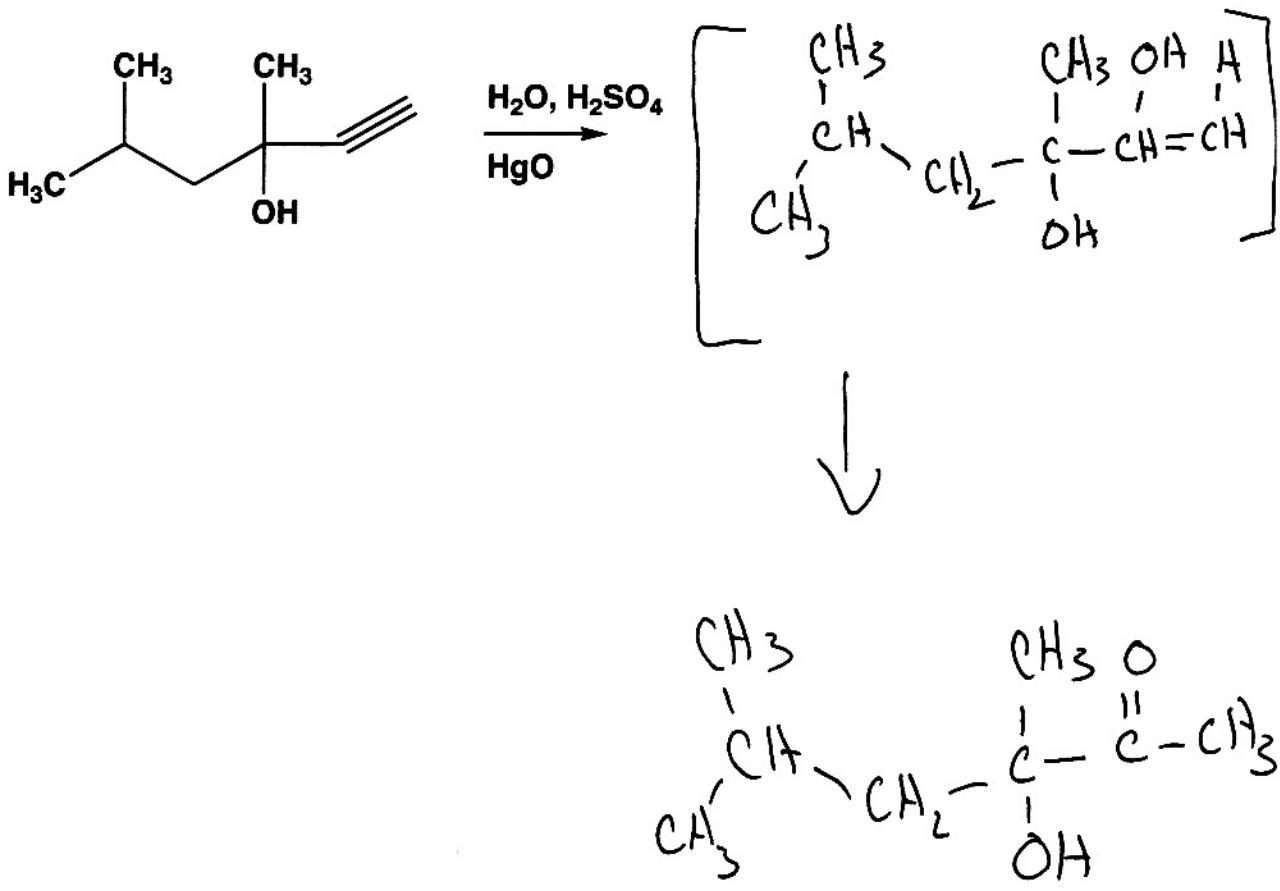

b)



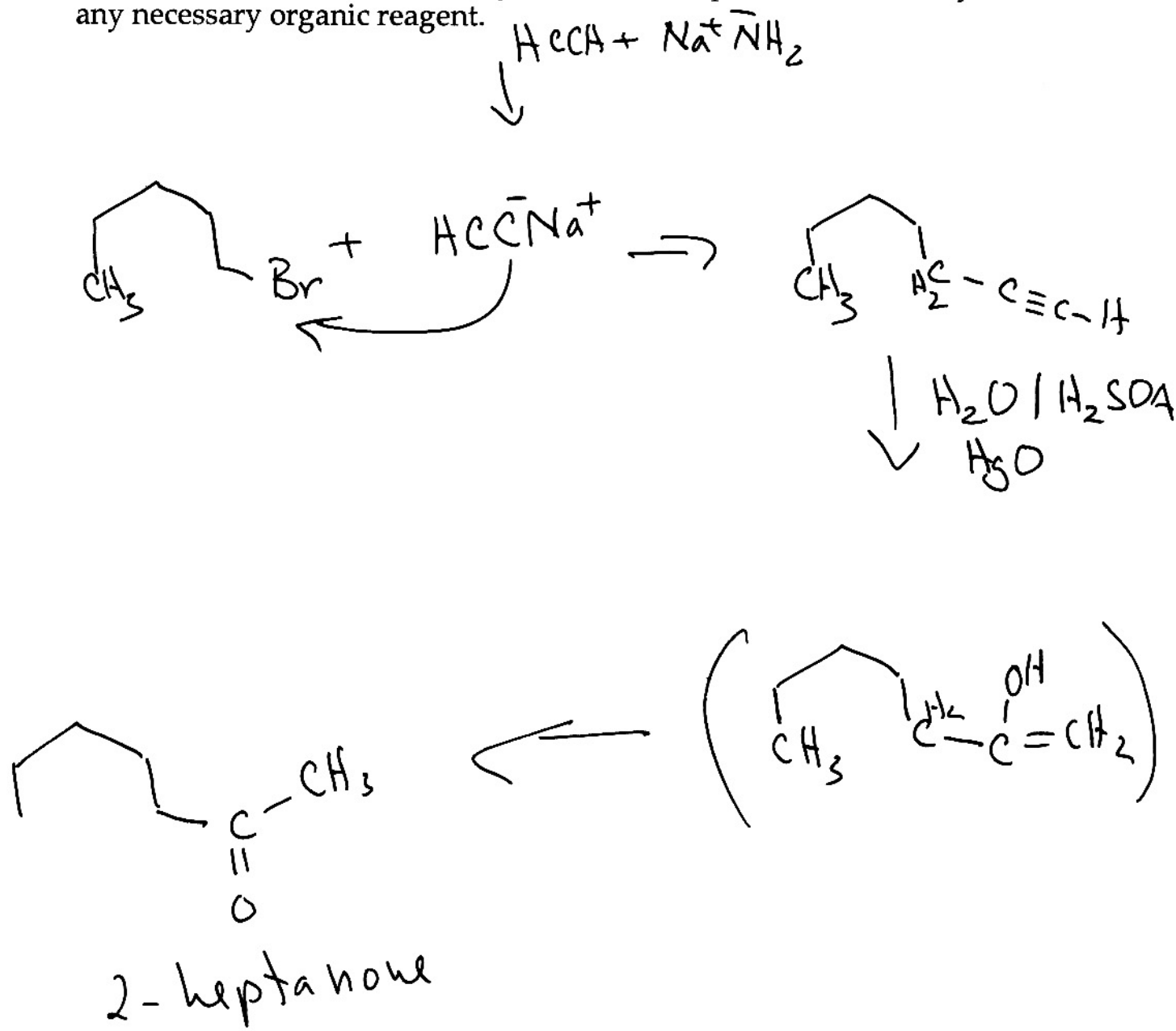
c)


1) $O_3$
2) $H_2O$
COOH
COOH

d)

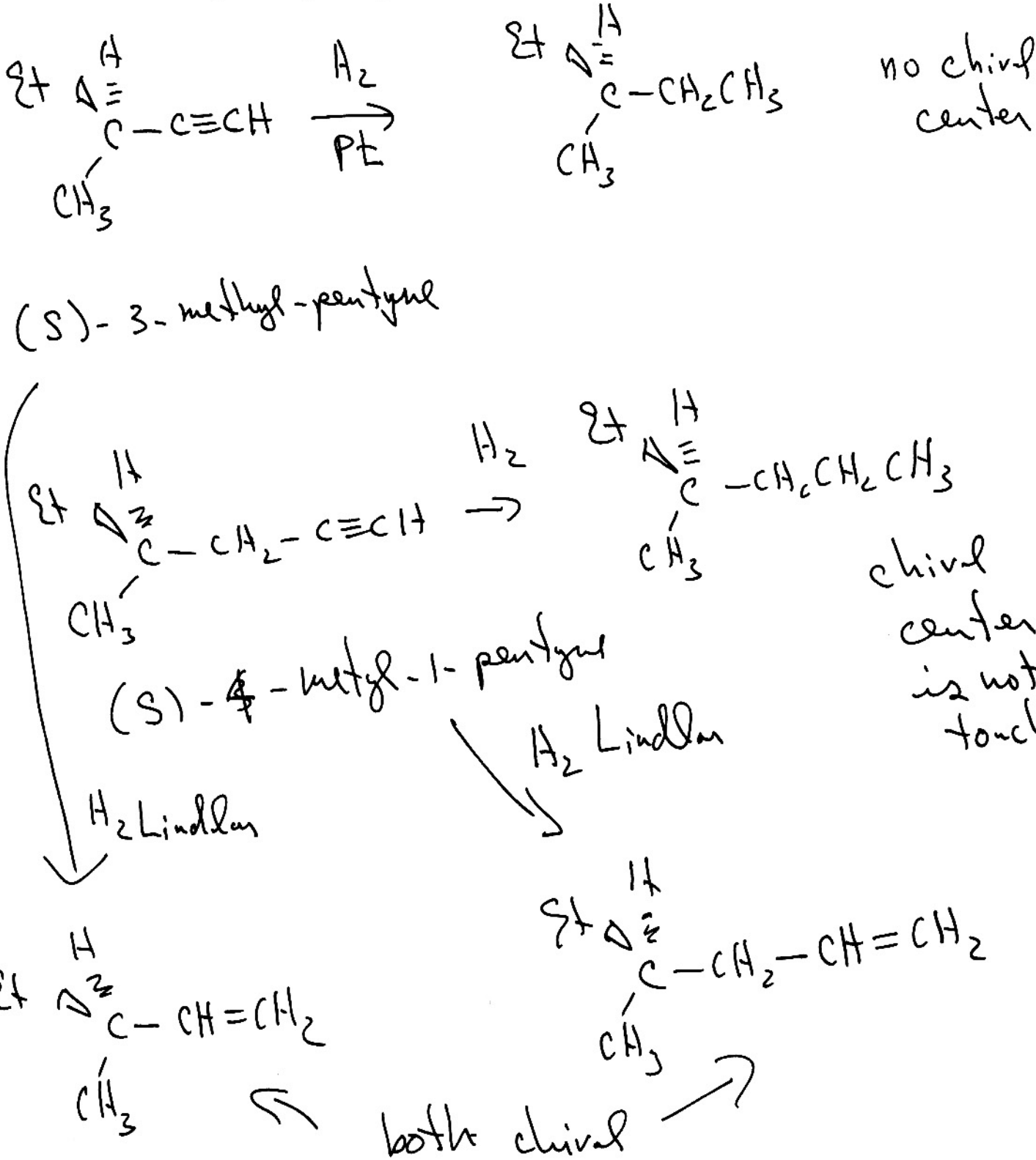

$CH_3$
$CH_3$
$H_3C$
OH
$H_2O$, $H_2SO_4$
HgO
$CH_3$
CH
$CH_2$
C
$CH_3$
OH
H
CH
$CH_3$
OH

2. (10 pts) The ketone, 2-heptanone has been identified as contributing to the oder of cheese. Describe a synthesis of 2-heptanone from acetylene and any necessary organic reagent.



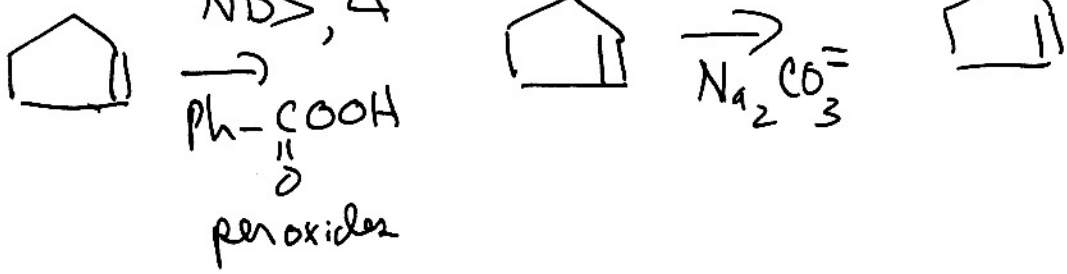
3. (10 pts) The alkane formed by exhaustive hydrogenation of (S)-4-methyl-1-hexyne is optically active, but the one formed by the hydrogenation of (S)-3-methyl-pentyne is not. Explain

Would be the products formed by hydrogenation in the presence of a Lindlar catalyst be optically active?

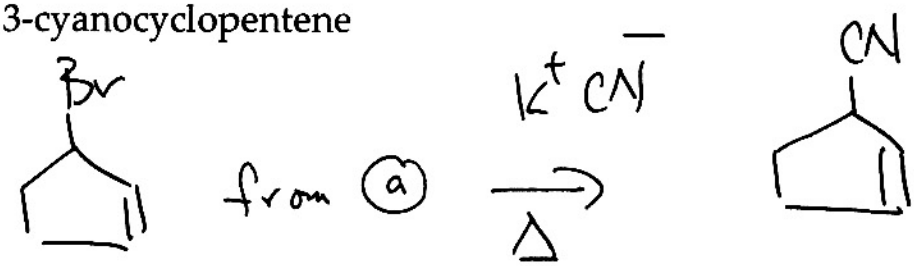


4. (20 pts) Devise a synthesis to prepare the following compounds starting with cyclopentene.

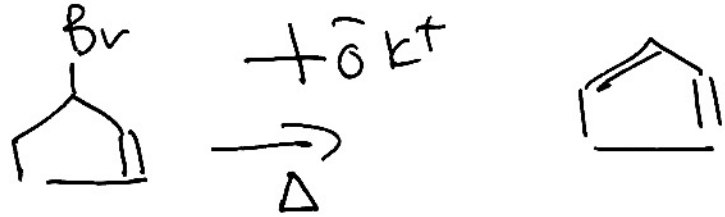
a) 2-cyclopentenol



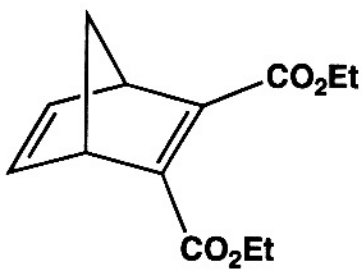

b) 3-cyanocyclopentene

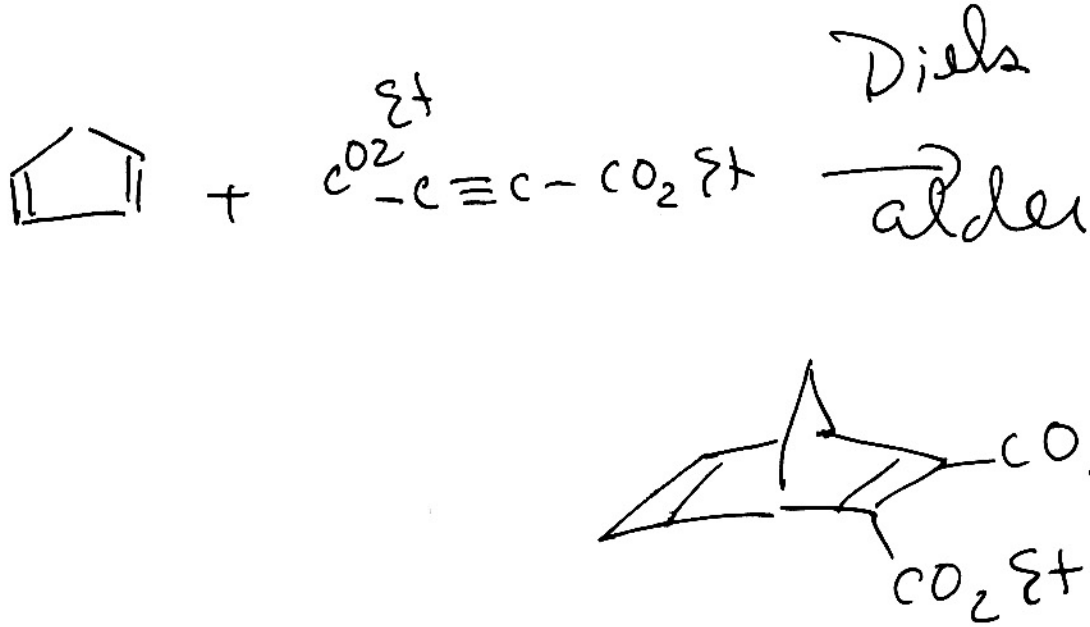


c) 1, 3 cyclopentadiene

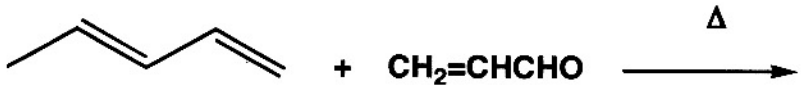



d)

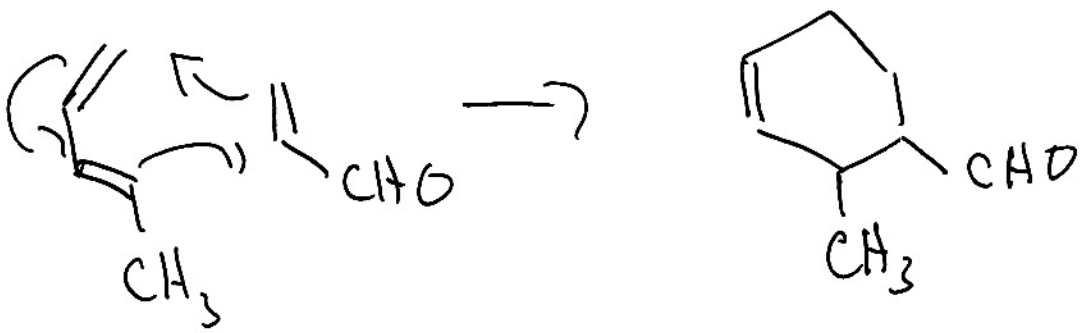


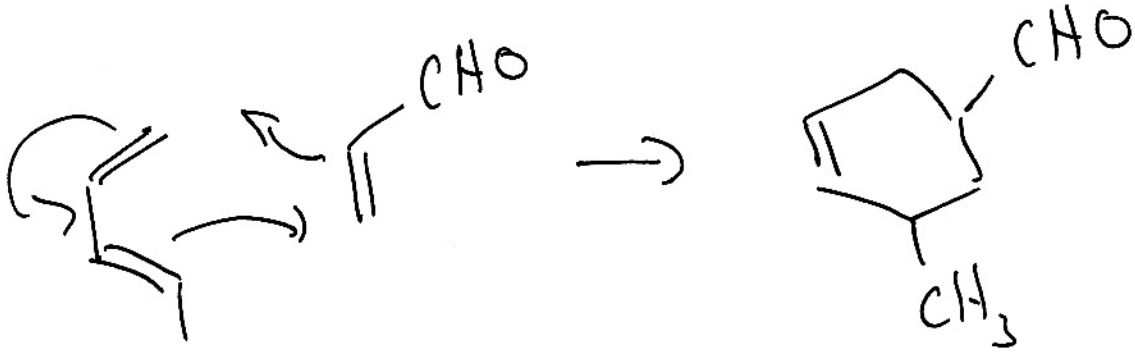
5. (10 pts) A pair of constitutional isomers of molecular formula, $C_8H_{12}O$, are fromed in the following reaction. Ignoring stereochemistry, suggest reasonable structures for these Diels-Alder adducts.



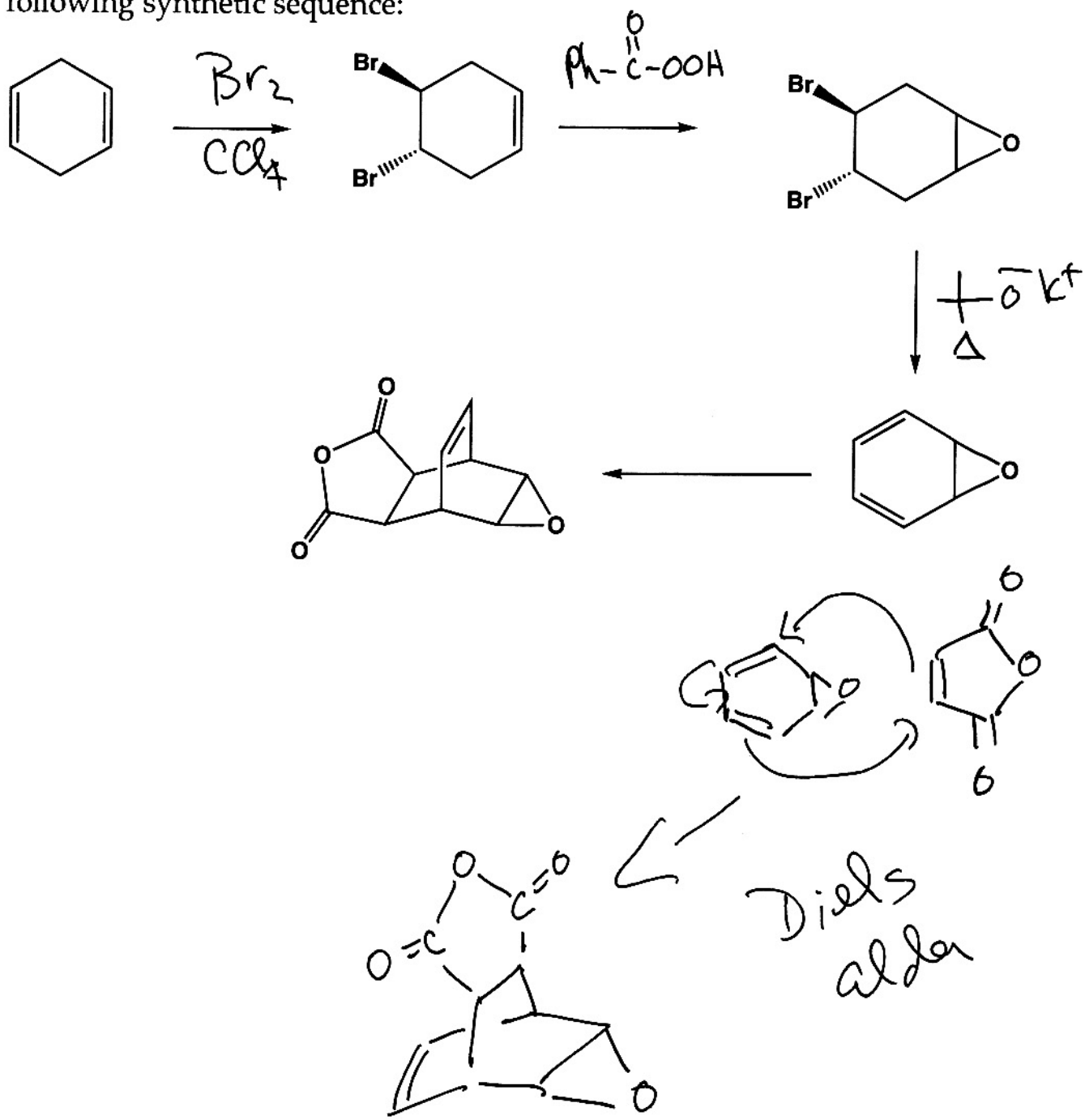


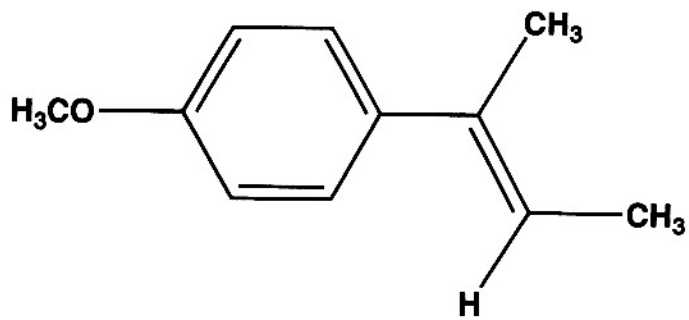

OR



6. (10 pts) Suggest suitable reagents for carrying out each step in the following synthetic sequence:

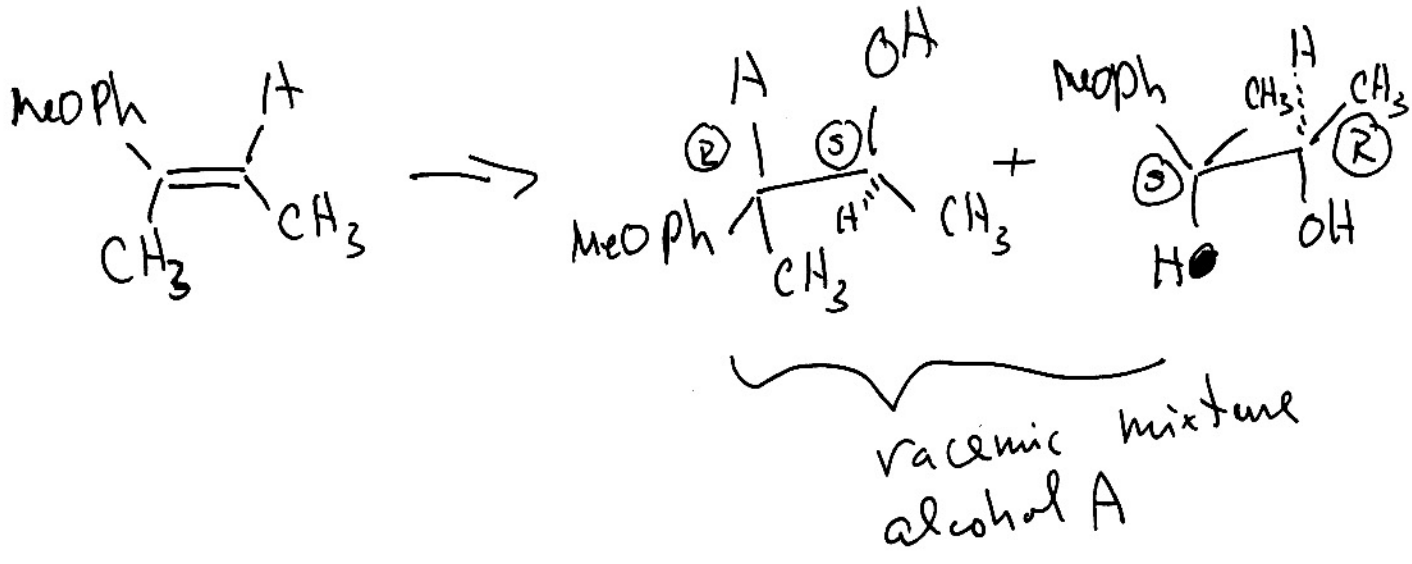


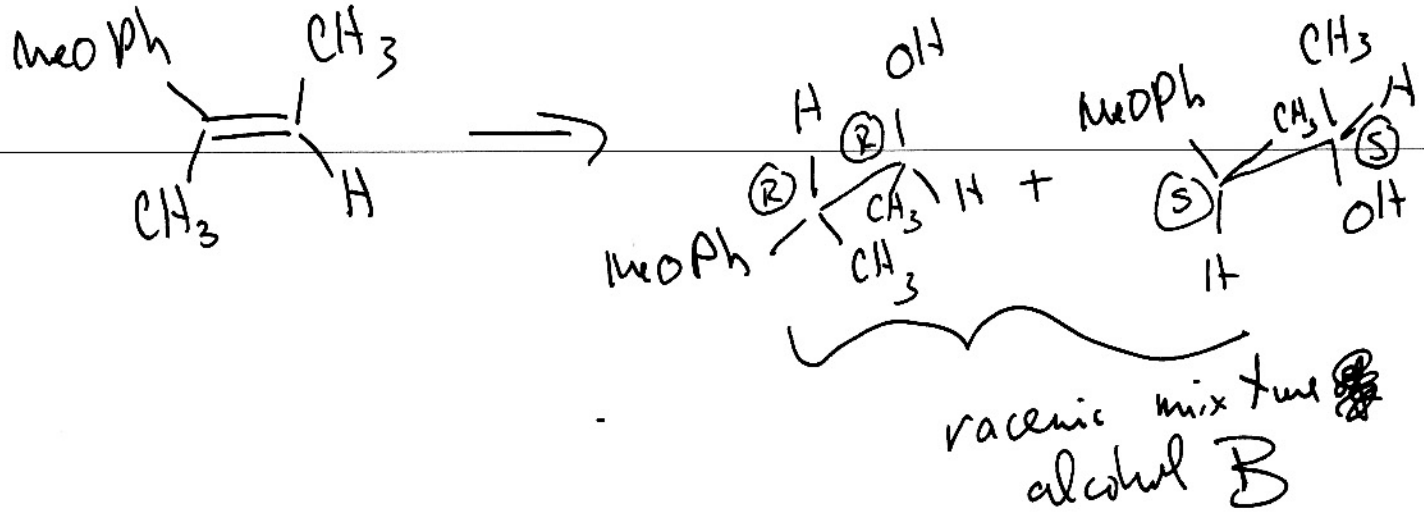
7. (10 pts) Hydroboration-oxidation of (*E*)-2-(*p*-anisyl)-2-butene yielded an alcohol A, mp 60°, in 72 % yield. When the sam reaction was performed on the Z alkene, an isomeric liquid alcohol B was obtained in 77% yield. What are A and B. How do their stereochemistries relate to each other?



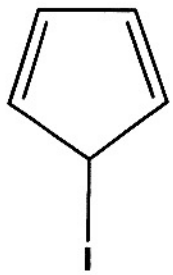

**(*E*)-2-(*p*-anisyl)-2-butene**

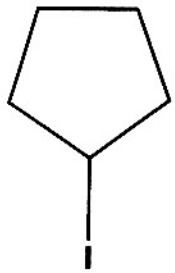
1) $B_2H_6$
2) HOOH / $HO^-$

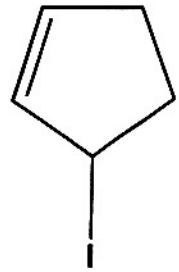


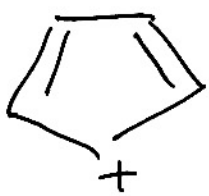
8. (10 pts) Suggest an explaination for the observed order of $S_N1$ reactivity of the following compounds.



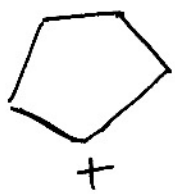




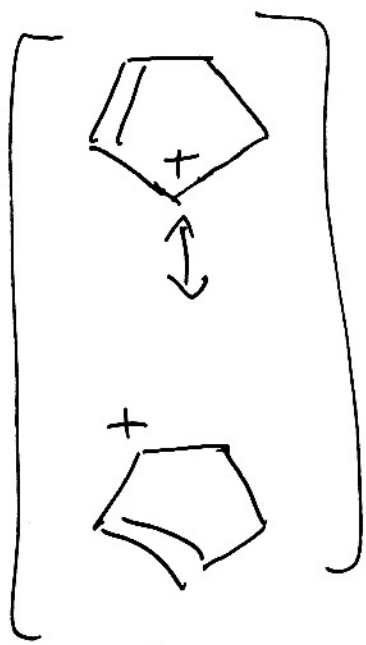
**least reactive** **most reactive**



not aromatic
(2+2) = 4 π
Bad



2° cation



allylic cation