Second 2-Hour Exam

By printing your name below, you pledge that

"On my honor, as a University of Colorado at Boulder student,
I have neither given nor received unauthorized assistance on this work."

Name _____

Recitation TA's Name:_____
Recitation Day and Time: _____

Points:

Problem #	Max. Points	Your Score
1	10	
2	10	
3	30	
4	30	
5	20	
BONUS	5	

_____ TOTAL (out of 100)

General Instructions:

- You have 2 hours to complete the exam
- Please write your name on the top of each page
- Use the back of pages for scratch paper
- Don't cheat!

Laboratory peer pressure

Question # 1 **10 pts total**

Circle the correct answer (2 pts each):

a) Osmium tetraoxide is a cheap, non-toxic substance. . TRUE FALSE

b) Cuprates are useful for epoxide opening because they are more basic than Grignard reagents. TRUE FALSE

c) LAH is a useful reagent for the reduction of esters to aldehydes. TRUE FALSE

d) Carbenes are reactive species that contain a carbon atom with 7 valence electrons. TRUE FALSE

e) Catalysis works by reducing the activation barrier to a reaction. TRUE FALSE

f) Condensation of a primary or secondary amine with a ketone gives an imine. TRUE FALSE

g) Oxidation can involve the removal of O from an organic compound. TRUE FALSE

h) Jones oxidation is a useful method for the oxidation of primary alcohols to aldehydes. TRUE FALSE

i) Epoxides are more reactive than regular ethers because of angle strain. TRUE FALSE

j) A catalyst affects the equilibrium position of a reaction. TRUE FALSE

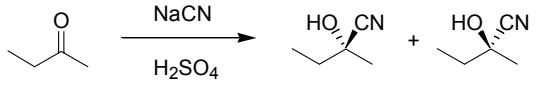
Question # 2 **10 pts total**

For each of the reactions below

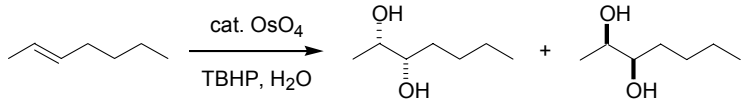
(i) indicate what the relationship between the products is (enantiomers; diastereoisomers; or same compound)

and (ii) indicate whether you would expect the products to be formed in equal (E) or non-equal amounts (NE). If you think the question of the ratio of products is not relevant to a particular example write NA.

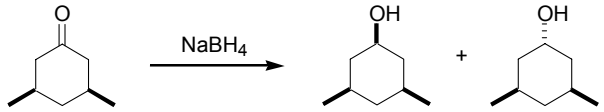
a)



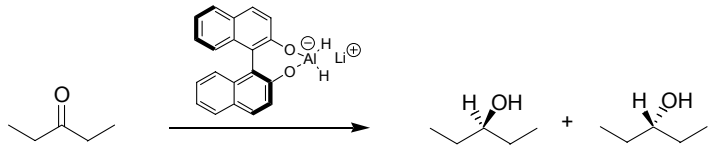
b)



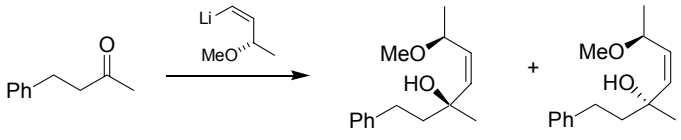
c)



d)



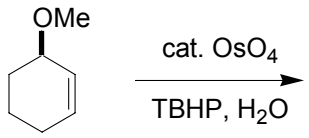
e)



Question # 3 **30 pts total**

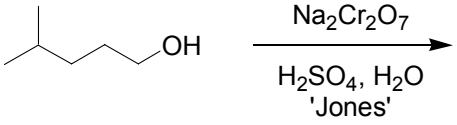
Draw the product of the following reactions. If more than one compound is produced draw both. In cases where diastereoisomers are formed be sure to draw both!

a)



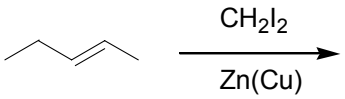
4 pt

b)



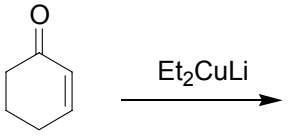
3 pt

c)



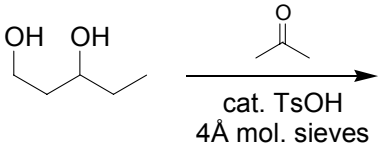
3 pt

d)



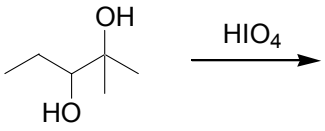
3pt

e)



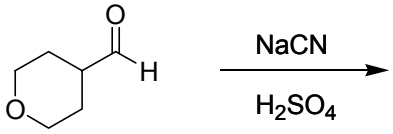
3pt

f)



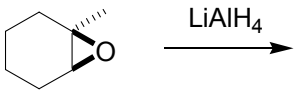
4pt

g)



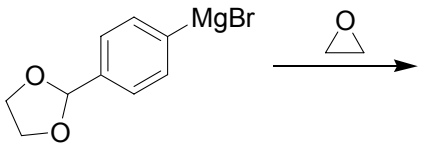
4pt

h)



3pt

i)

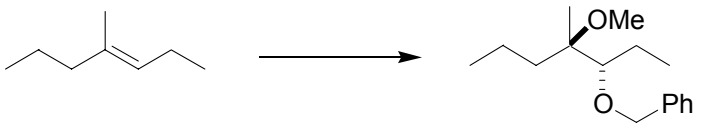


3pt

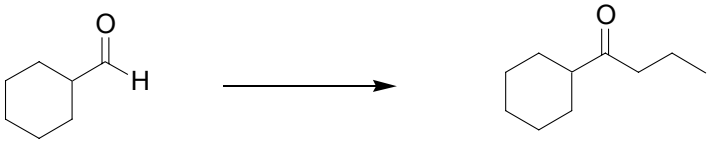
Question # 4 **30 pts total**

How would you synthesize the following molecules using organic reagents containing less than 7 carbons, and any inorganic reagents you choose. *Please pay attention to stereochemistry where it is shown!* For partial credit show retrosynthesis and/or the products of each step if your synthesis requires more than one step.

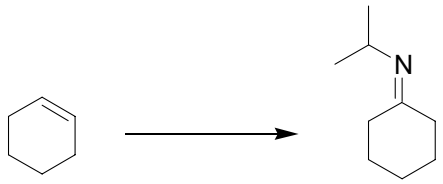
a) 9 pt



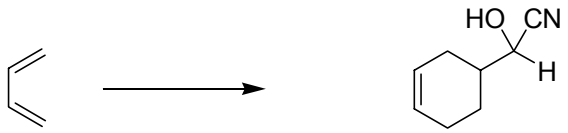
b) 4 pt



c) 9 pt



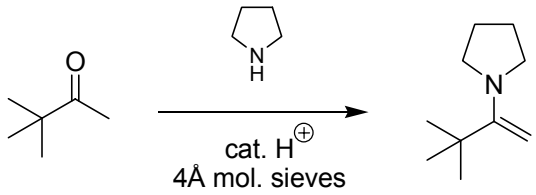
d) 8 pt



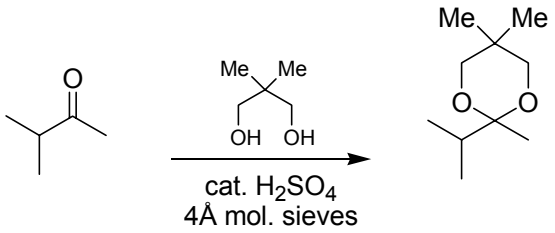
Question # 6 **20 pts total**

Write mechanisms for the following two reactions. *Be sure to show all the intermediates and all the arrows required for each step [including aqueous workup if it is required].*

a)



b)



Bonus Question

What are the two products of the following reaction? Worth 10 marks up to an exam total out of 100 (ie you can't get >100 on the exam).