CHEMISTRY 12A FALL 2018

EXAM 3

NOVEMBER 29, 2018

NAME- WRITE BIG _____

STUDENT ID: _____

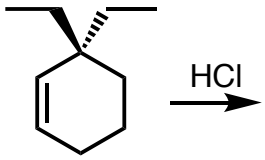
SECTION AND/OR GSI IF YOU ARE IN THE LABORATORY COURSE: _____

- **You will have 75 minutes in which to work.**
- **BE NEAT! Non-legible structure drawings will not be graded.**
- **Only answers in the answer boxes will be graded – you can write in other places, but we only grade the answers in the boxes.**
- **All pages of the exam must be turned in.**
- **No calculators**
- **No stencils**
- **Molecular models may be used**

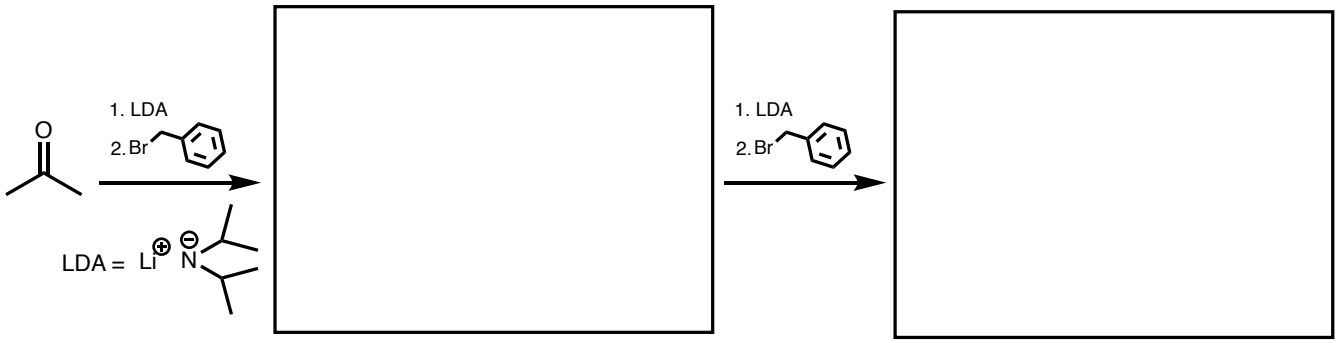
Problem	Points (Maximum)
1	32
2	12
3	14
4	24
5	28
6	10
Total	***120***

1. (32 points) For each reaction draw the major organic products, **including all stereoisomers**. Write NR if you think there will be no reaction.

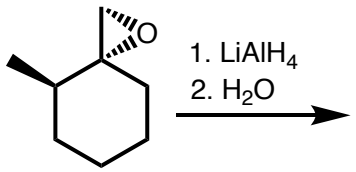
a.



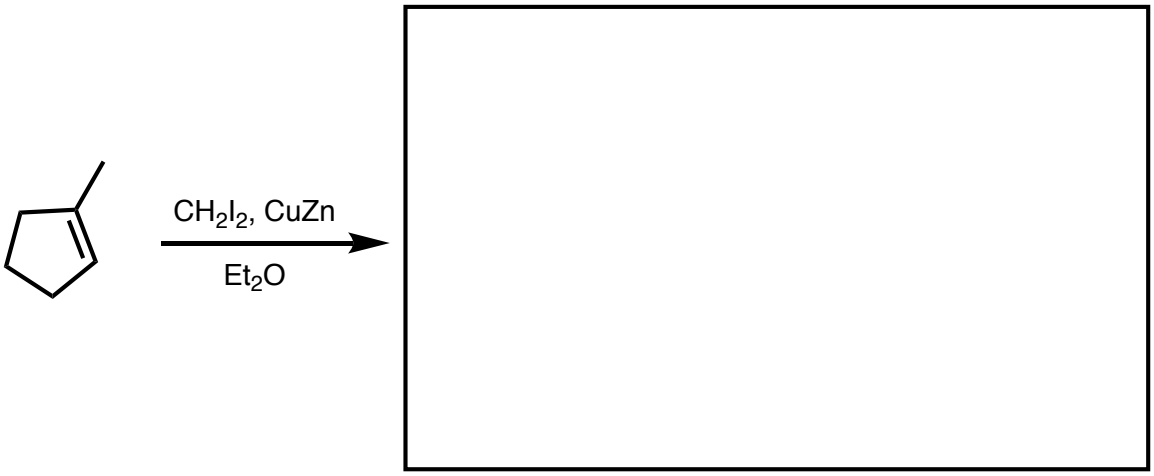
b.



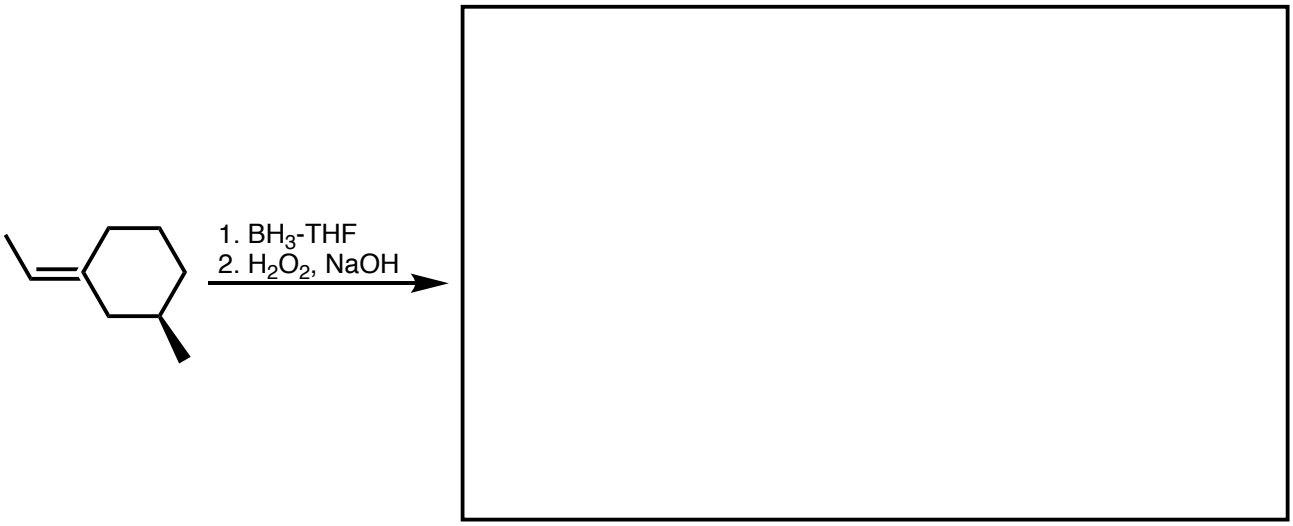
c.



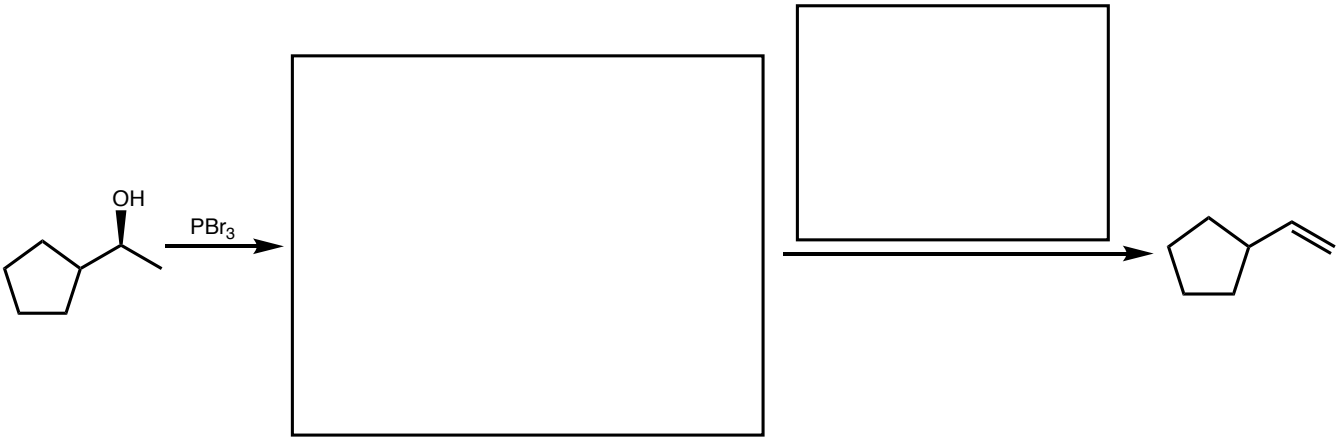
d.



e.

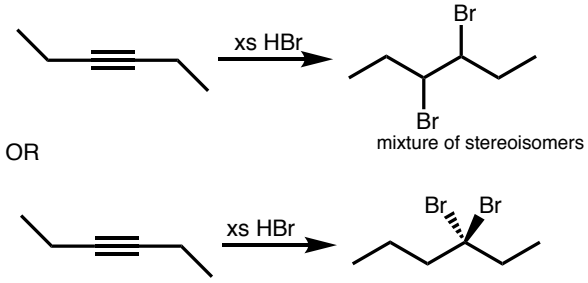


f.



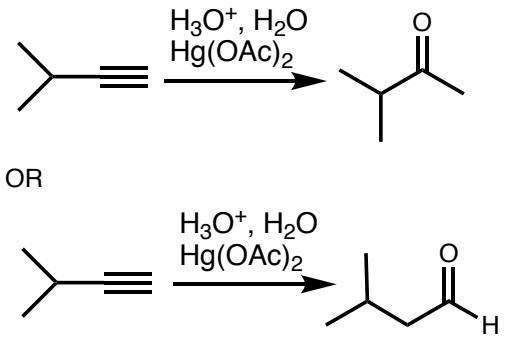
2. (12 points) **Circle** the reaction in the following pairs of reactions that shows the formation of the major products you would expect to observe. You may disregard any other products besides the ones pictured that may form under the reaction conditions. Give explanations in the boxes provided.

a.



Explanation for your choice of major products - include drawings of key intermediates:

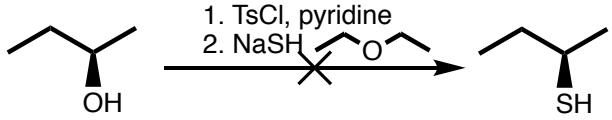
b.



Explanation for your choice of major products - include drawings of key intermediates:

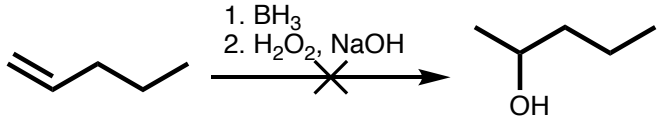
3. (14 points) The following reactions would not occur as written. i. What product would actually be made? ii. Why was the desired product not formed? iii. How could you change either the substrate **or** reaction conditions to give the desired product?

a.



What product is actually made? (Draw structure or NR for no reaction)	Why was desired product not formed? (Include **drawings** of any relevant structures)	How could substrate **or** reaction be changed to give desired product? Draw your revised reaction.

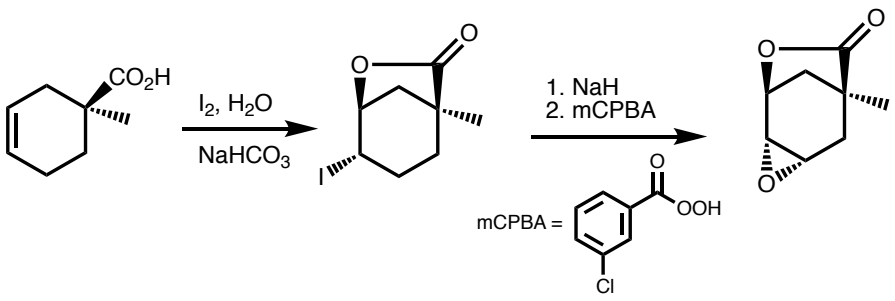
b.



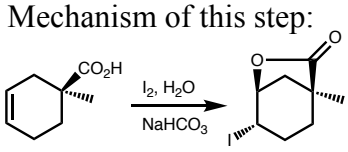
What product is actually made? (Draw structure or NR for no reaction)	Why was desired product not formed? (Include **drawings** of any relevant structures)	How could substrate **or** reaction be changed to give desired product? Draw your revised reaction.

4. (24 points) Mechanism

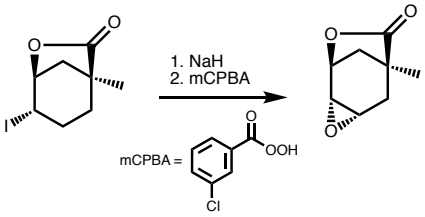
a. Draw the mechanism of the following reaction using arrows to indicate the flow of electrons.



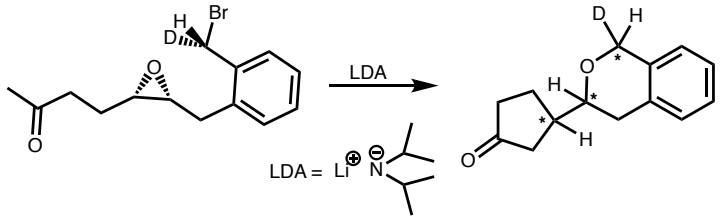
Mechanism of this step:



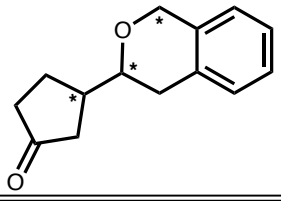
Mechanism of this step:



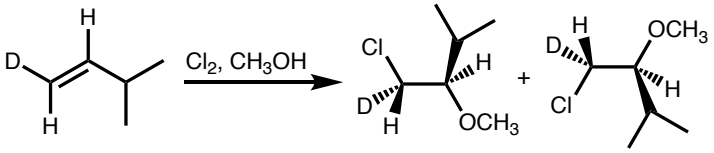
b. Draw the mechanism of the following reaction using arrows to indicate the flow of electrons. Only one stereoisomer is formed in this reaction. Draw the stereoisomer that is formed in the inset box.



Stereoisomer – draw in wedged or dashed H or D on the starred carbons in the structure below to indicate correct stereoisomer formed.



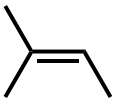
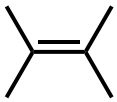
5. (28 points) Consider the following reaction.



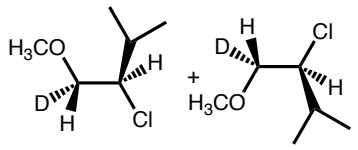
a. Draw the mechanism of this reaction using arrows to show the flow of electrons.

b. In all of the addition reactions we have covered, the alkene acts as the Lewis base and the other reagent as the electrophile or Lewis acid. In the box below, sketch the interaction between the orbital the alkene uses as the Lewis Base and the orbital used by the Cl_2 electrophile as the Lewis acid. Label each orbital.

c. Relative rates of three different alkenes reacting with Cl_2 in CH_3OH are given below. Briefly explain why more substituted alkenes react faster.

	Relative Rate
	50
	1×10^4
	4.3×10^6

d. Explain why the products shown below are not major products. Draw relevant intermediates to support your explanation.



e. Describe two pieces of evidence based on the products observed in this reaction that a free carbocation is not an intermediate.

1st piece of evidence:

2nd piece of evidence:

6. (10 points) Synthesize the indicated product from the indicated starting as your only organic reagent. In your synthesis, show each product formed by each set of reagents you use.