**S2018 Organic Chemistry I**
**Mid-Term Exam 2**

**Name (print):**

**Name (Sign) :**

**Recitation Instructor Name (so we can get it back to you):**

**Instructions**

1. Keep the exam closed until you are instructed to begin.

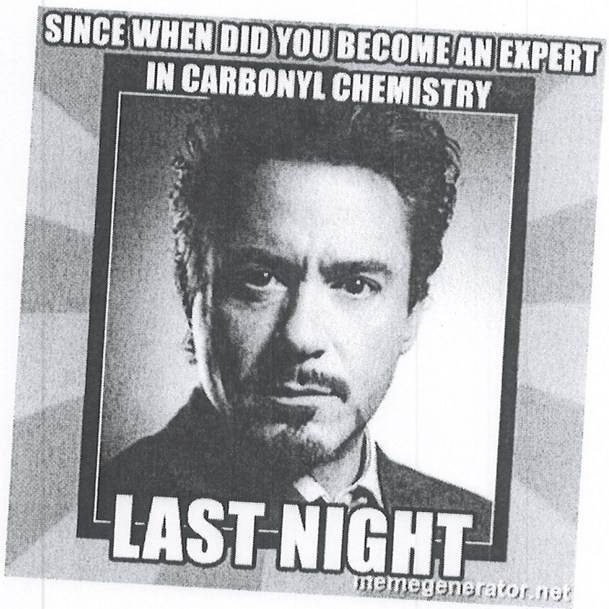
2. The exam consists of 6 questions. The first thing you should do is make sure that no pages are missing. If a page is missing, notify a proctor immediately.

3. You will have 1 hr and 15 minutes to complete the exam, at which time pencils must be put down. Budget your time wisely.

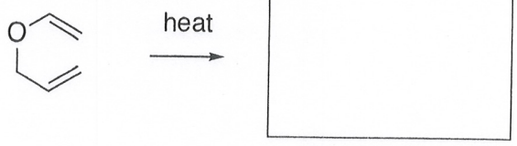
4. Make sure to show all of your work, and make it clear what your thought process was. Answers should fit in the space provided. If you need to use the back of the sheet of paper, you must make note of it in the space allotted for credit.

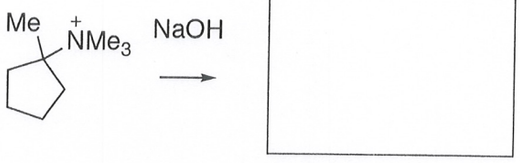
**Breakdown**

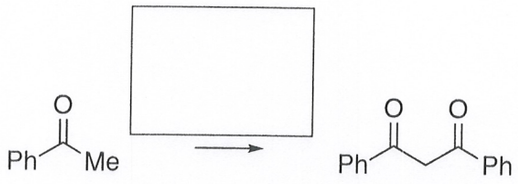
**1. ___ / 30**
**2. ___ /30**
**3. ___ / 10**
**4. ___ / 10**
**5. ___ / 10**
**6. ___ / 10**
**total ___ / 100**

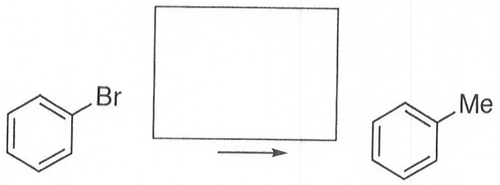


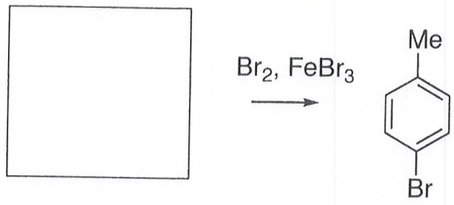
1) **Reactions.** *Fill in the missing product, reactant or reagents* **(30 points, 5 points each).**

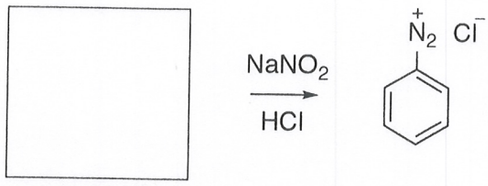
(a) 


(b) 

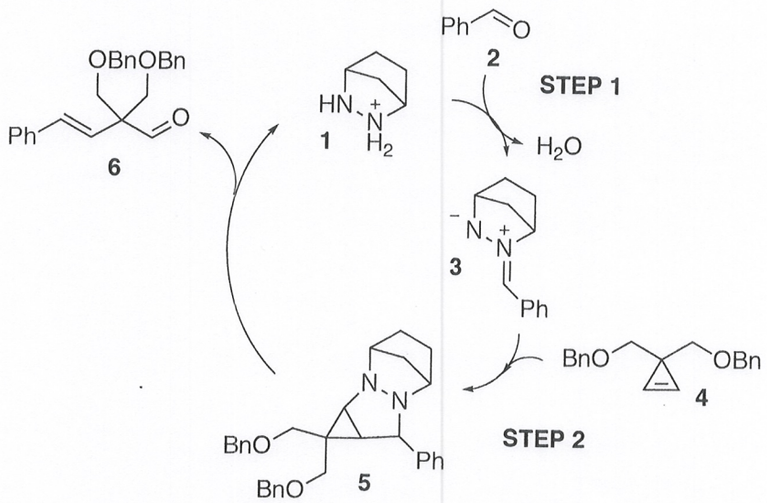

(c) 


(d) 


(e) 


(f) 

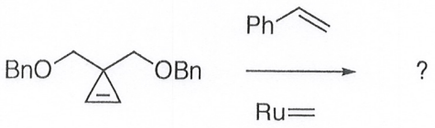

2) **Mechanism.** *For questions 2a-2c, refer to the abbreviated catalytic cycle below for a carbonyl-alkene metathesis reaction developed by Tristan Lambert's group . (30 points, 10 each)*



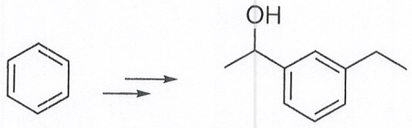
2a. Show the mechanism for Step 1 (**1** + **2** → **3**) (10 points).

2b. Show the mechanism for Step 2 (**3** + **4** → **5**) (10 points).

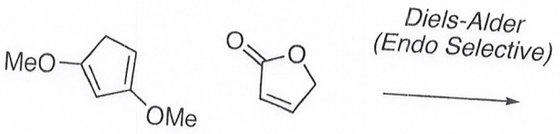
2c. The analogous alkene-alkene ring-opening/cross metathesis would generate a molecule very similar to **6**. What is this molecule, and draw a mechanism for its formation (10 points).



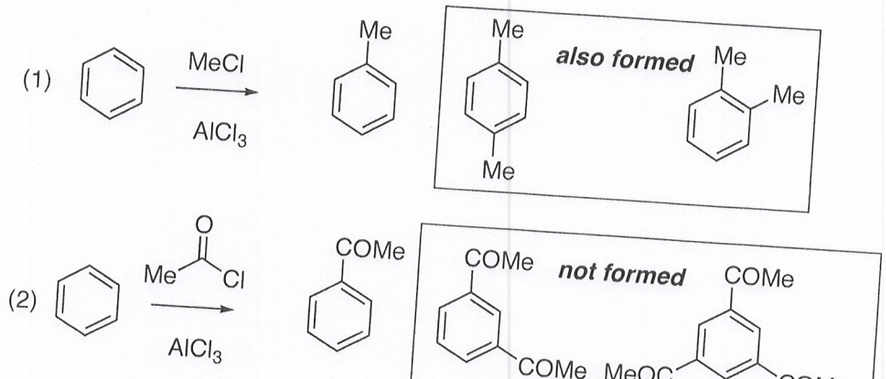

3. **Synthesis**. *Show the reactions necessary to carry out the following interconversion (10 points)*



**4. Pericyclic Reactions.** *Show the product resulting from the following Diels-Alder Reaction, making sure to address both regiochemistry and stereochemistry* (10 points)

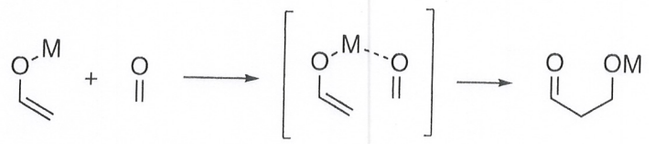



**5. Concept Question.** *Friedel Crafts alkylation (equation 1) often suffers from overalkylation (multiple alkylations). On the other hand, Friedel-Crafts acylation (equation 2) does not have this same issue.* ***BRIEFLY*** *explain why overalkylation is a major challenge associated with alkylation and not acylation? (10 points)*




**Answer**

6. **Grand Challenge**. Enolate chemistry can proceed through a 6-membered ring transition state that leads to stereoselective reactions, similar to the Cope and Claisen rearrangements.




Using this information, circle the correct diastereomer, and explain your answer using chair-like conformations. (10 points)