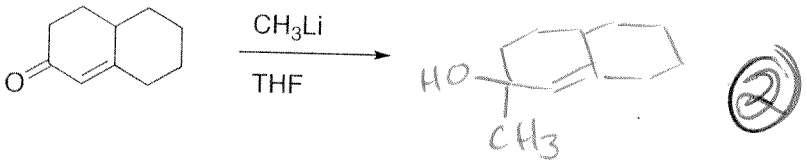
Answer Key

Name:
Student #:

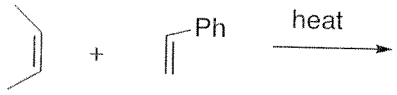
CHM 3120
Intermediate Organic Chemistry (Fall 2011)
EXAM #2

Instructions: Please answer all questions in the space provided. If you require additional space use the back pages. The last page is blank. Model kits are permitted.
Time allotted: 2 hrs.

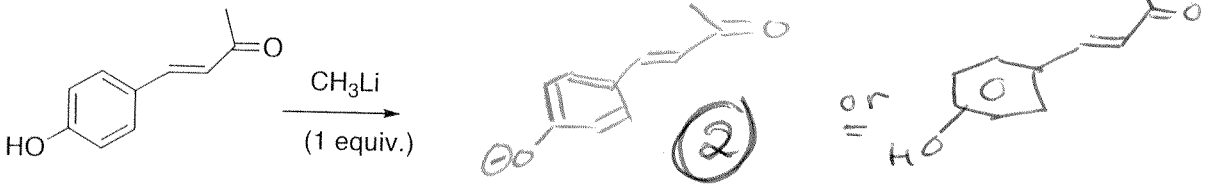
1. Provide the missing reagents or structure of the major product(s) in each of the following reactions. Be sure to denote relevant stereochemistry were necessary. You may assume standard aqueous workups. **(15 points)**

a) 

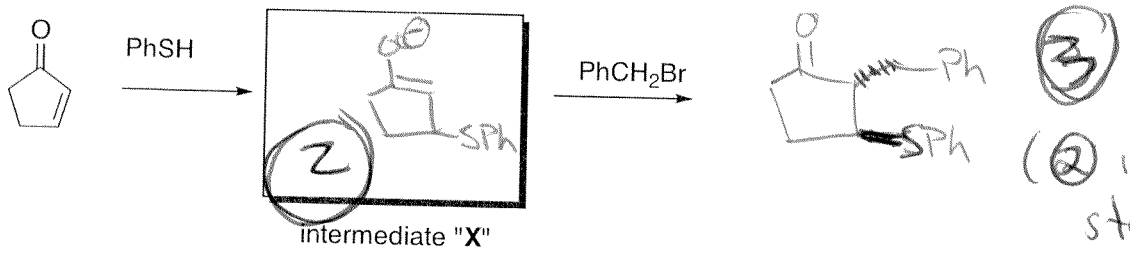
(2)

b) 

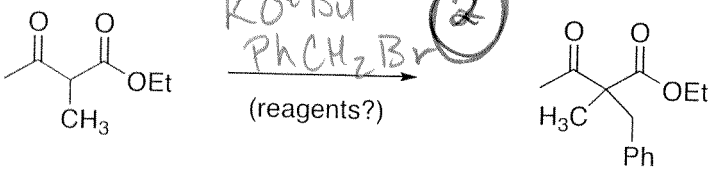
No Reaction (2)

c) 

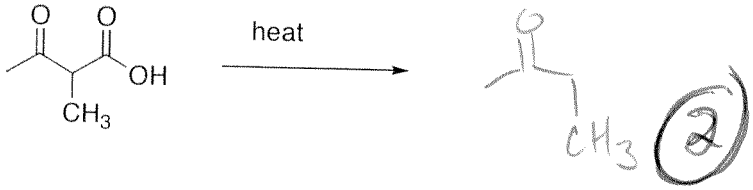
(2)

d) 

intermediate "**X**"
(2)
(3)
(2 if No stereochem)

e) 

(2)

f) 

(2)

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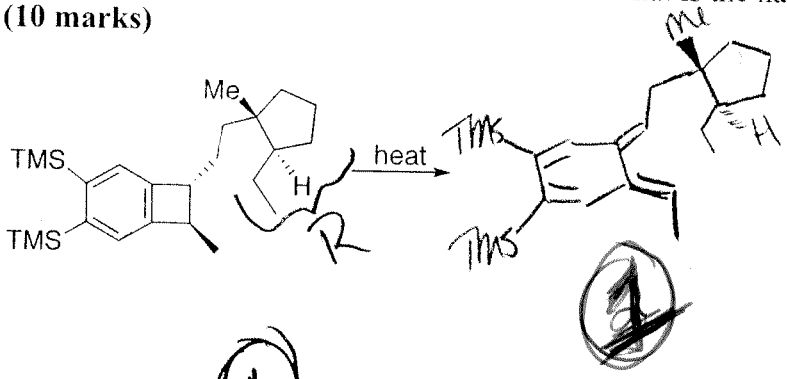
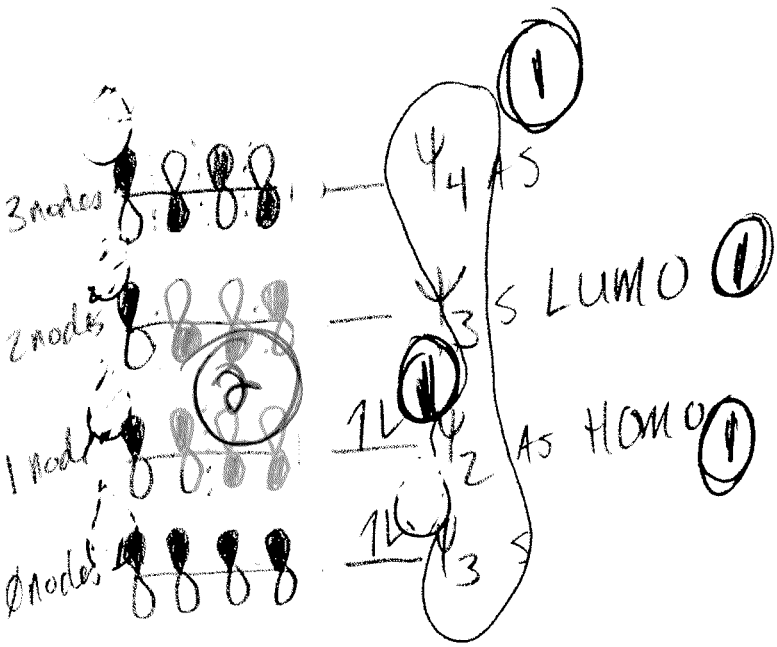
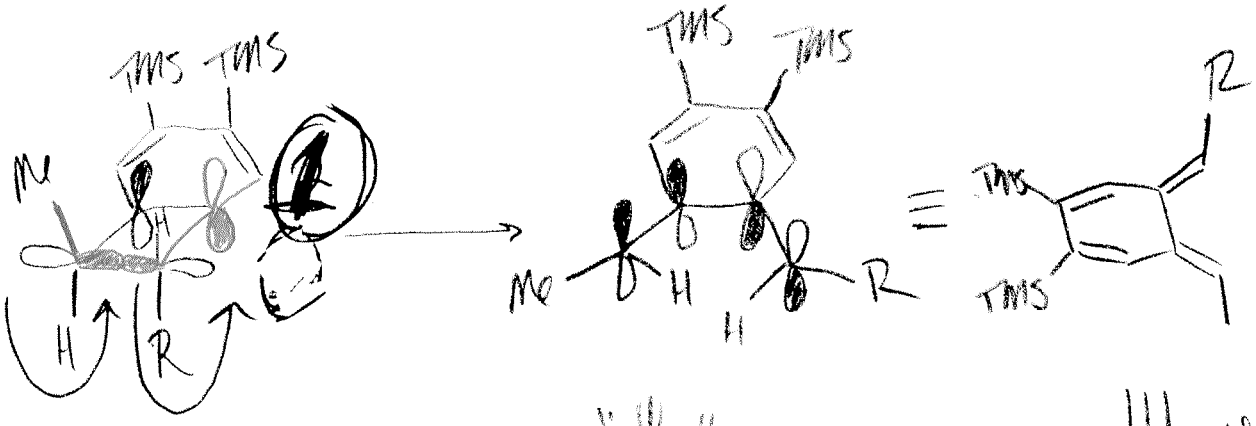
2. Consider the following reaction. What is the structure of the product from this reaction? Using FMO theory, rationalize the stereochemistry of the product. What is the nature of bond rotation in this reaction? What is the name of this reaction? **(10 marks)**



4πe⁻ (1)
electrocyclic
Ring opening



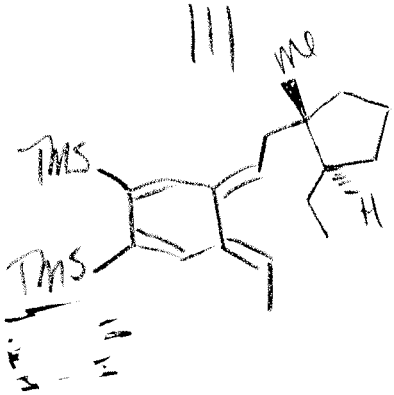
Use Ψ_2 (HOMO)



"Ψ_2"

Conrotatory
(1)

III



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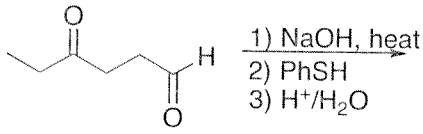
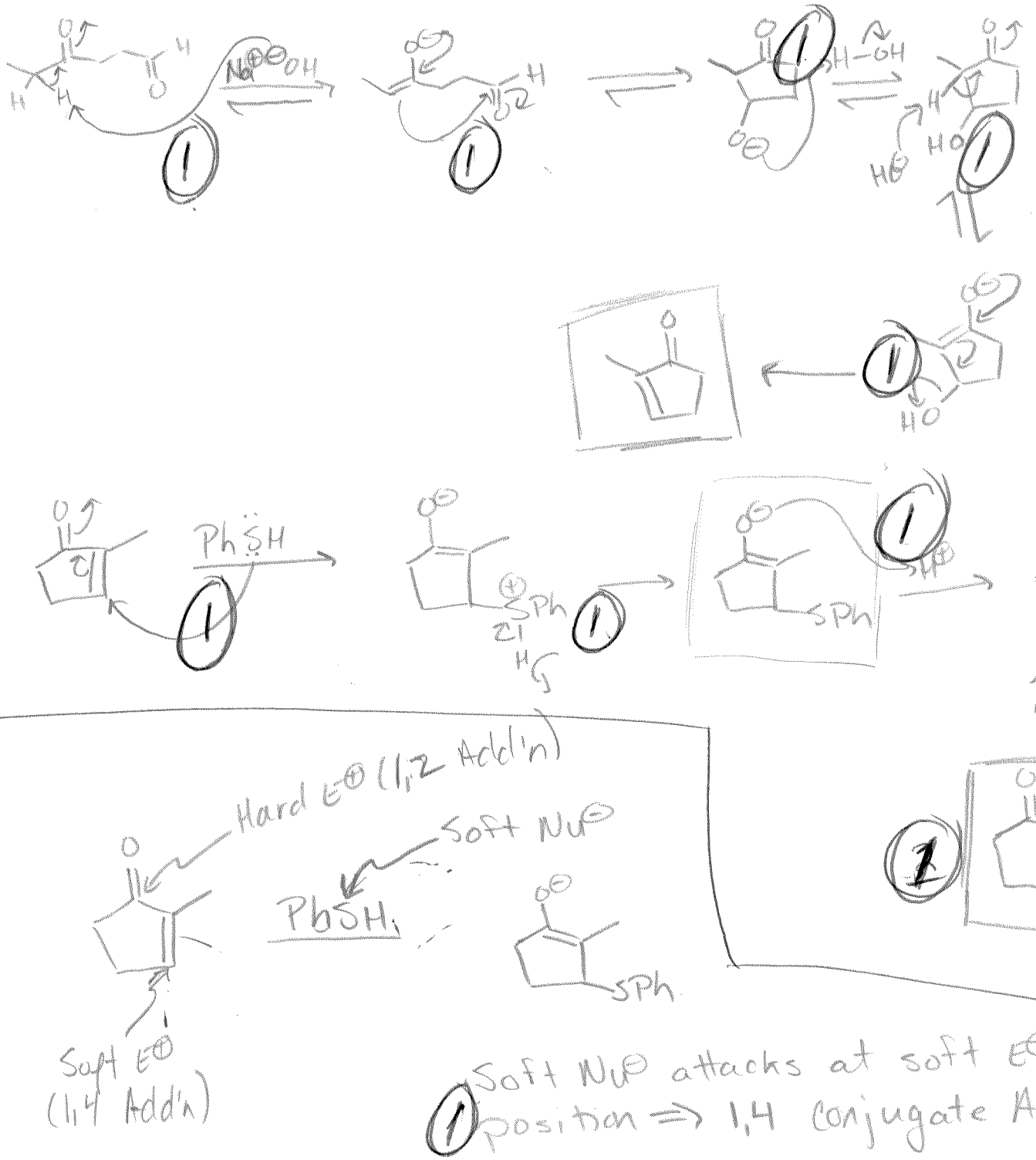
3. Consider the following sequence of reactions. Provide the structure of the product obtained after each step? Provide a detailed mechanism for each of these steps. Explain the regiochemical outcome of the second step. **(10 marks)**





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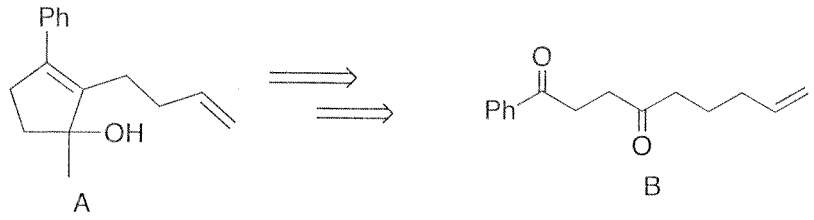
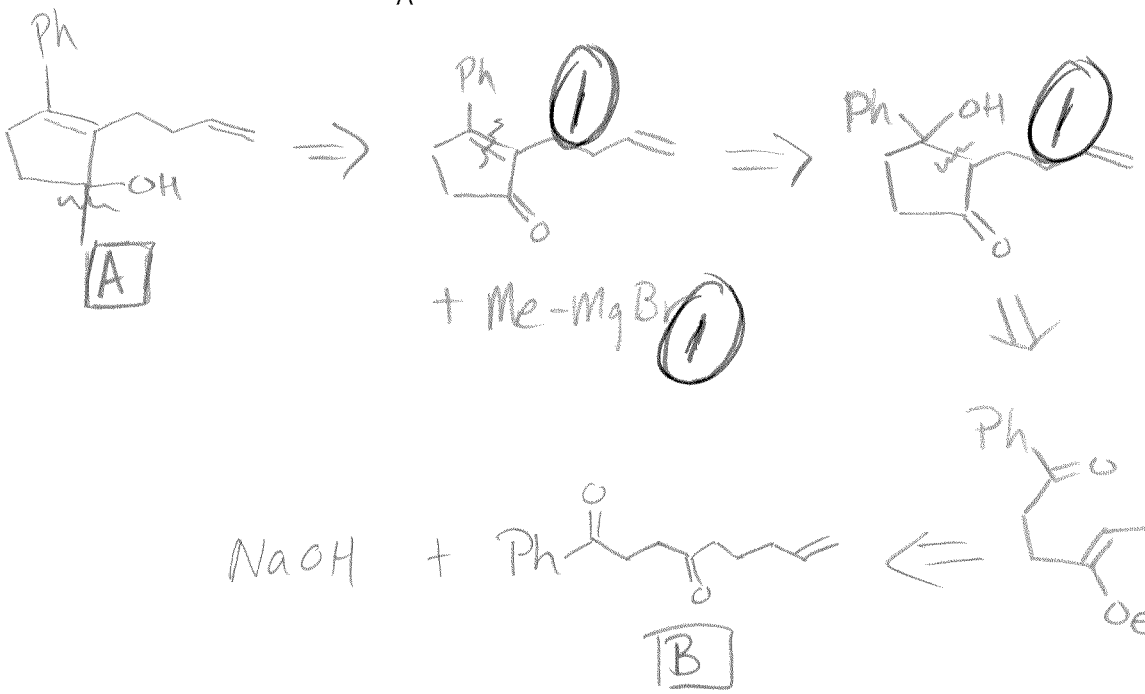
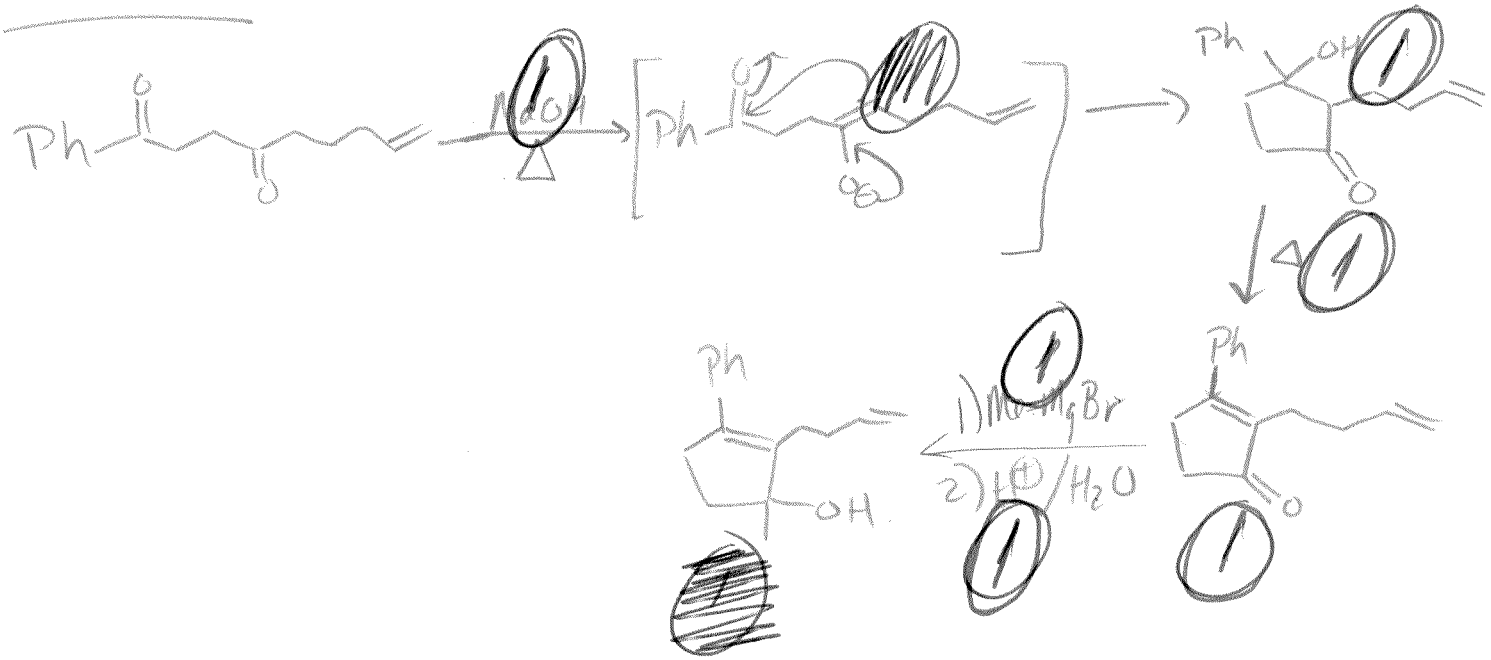
4. Provide a synthesis of **A** starting from **B** using any reagents that you may require. As part of your answer, include a detailed retrosynthesis. **(10 marks)**



Retro:



Forward:



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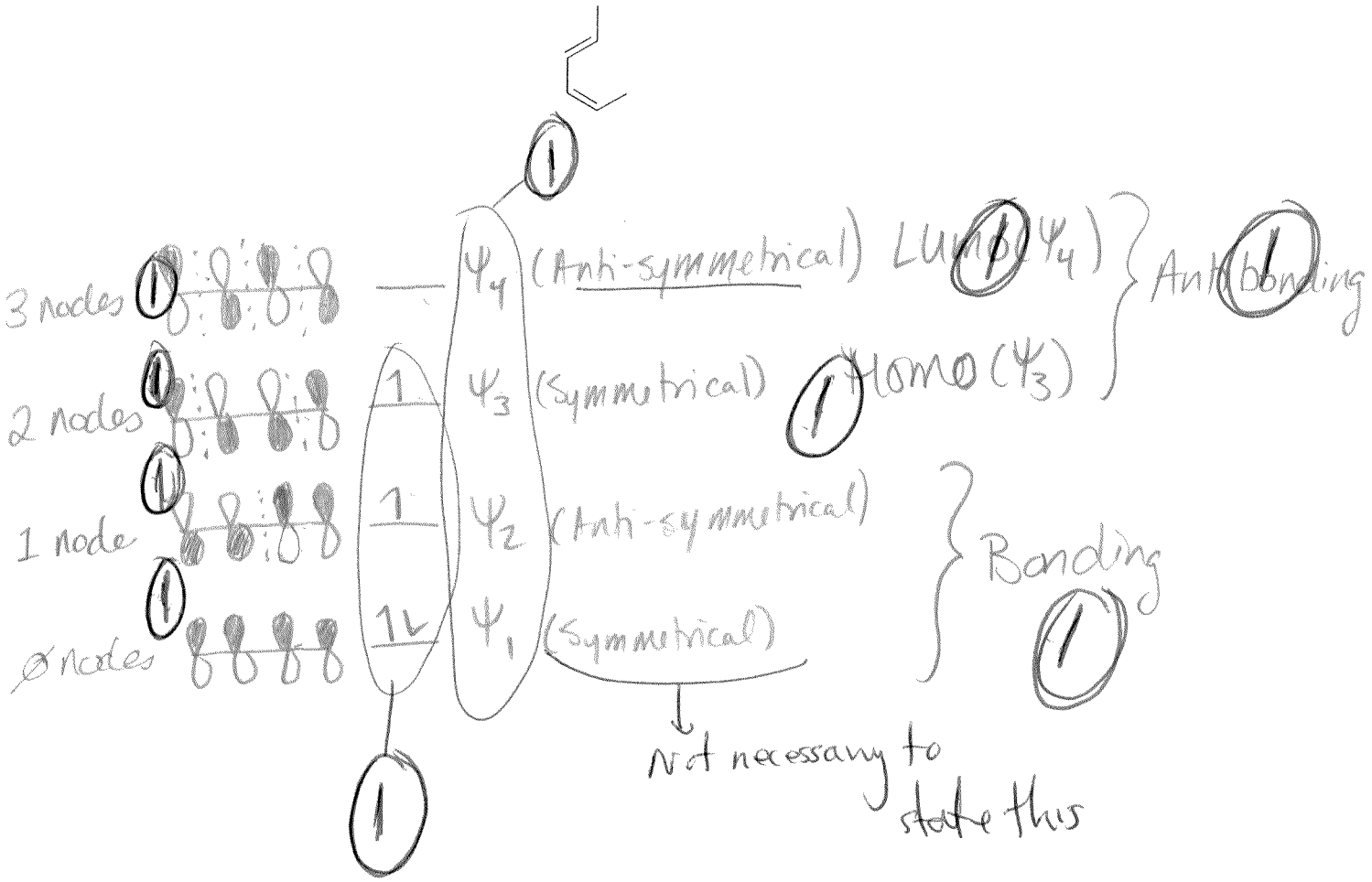
5. Consider the following molecule. Draw the LCAO representation of all the π molecular orbitals for the excited state. Clearly label all bonding and antibonding orbitals and show the symmetry of each molecular orbital **(10 marks)**



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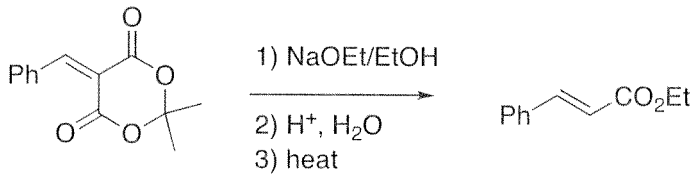
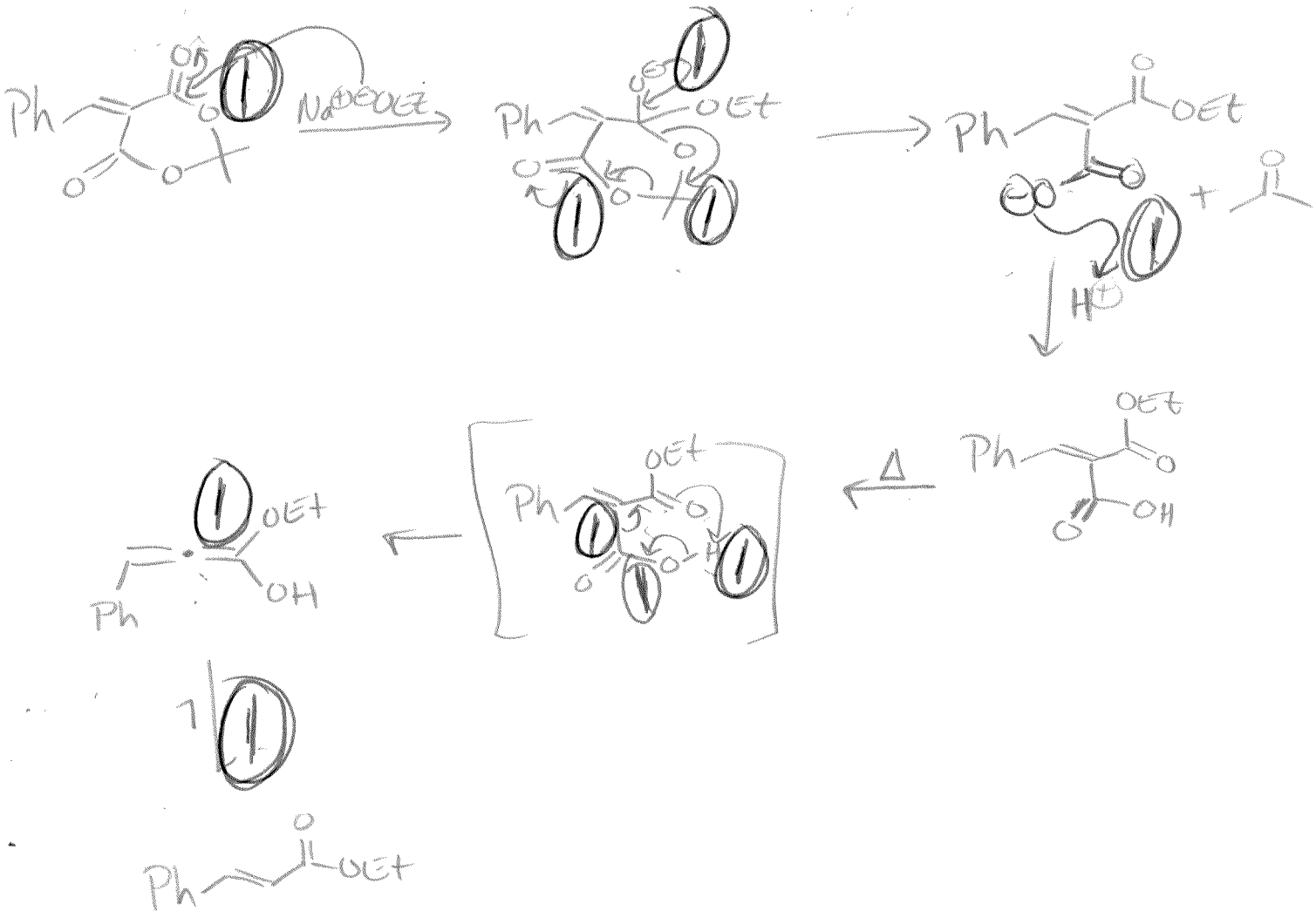
6. Provide a detailed mechanism for the following reaction sequence. You must show all proton transfers for full credit. **(10 points)**





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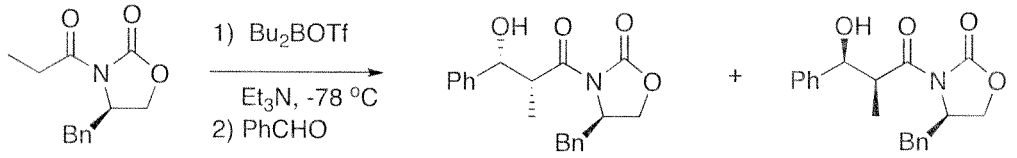
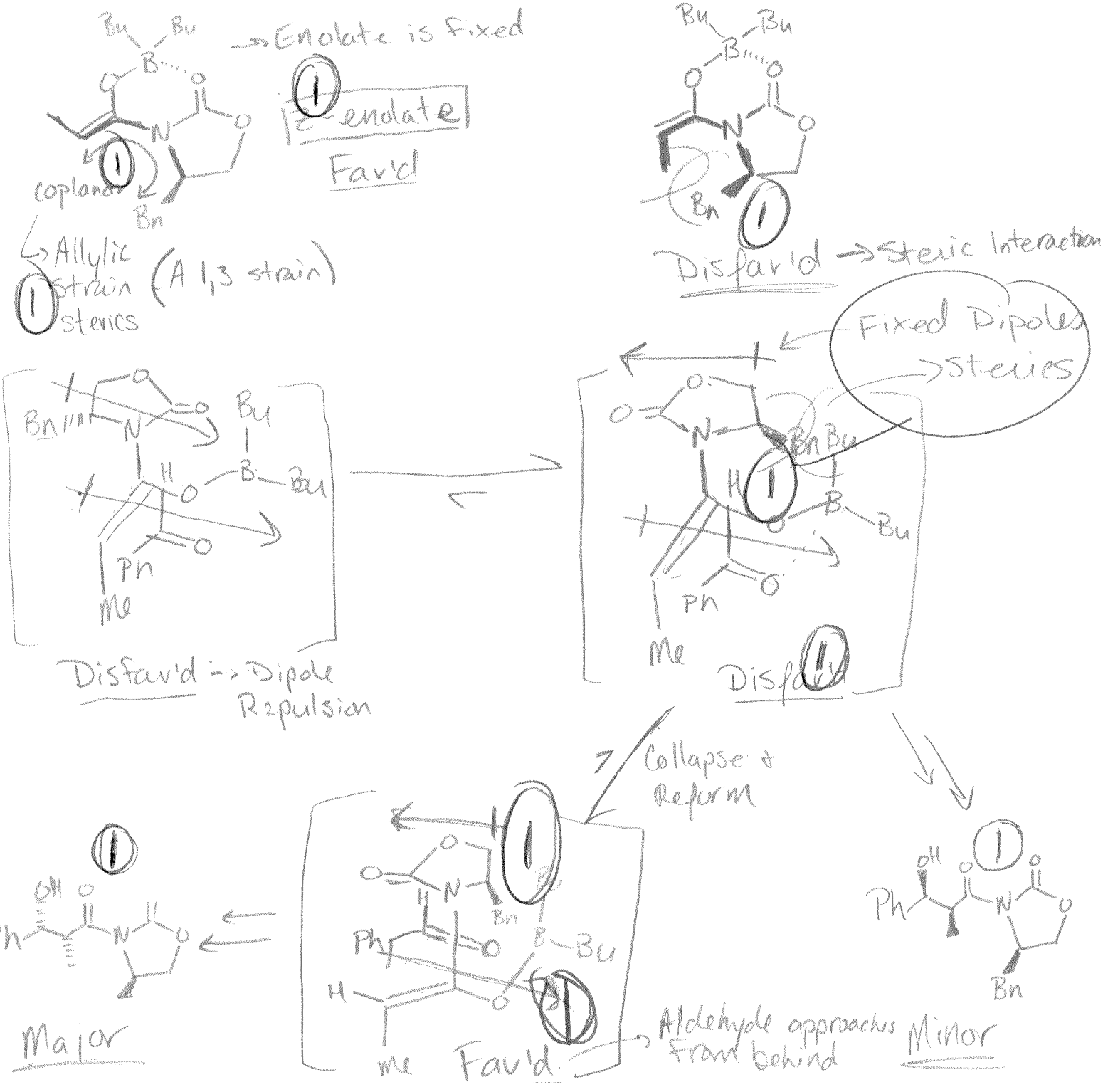
7. Consider the following reaction. There is a major and minor product formed. What is the structure of the enolate formed? Clearly explain why enolate formation is selective. Draw the transition states for the major and minor products and explain why the formation of the major product favoured. **(10 points)**





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8. Propose a synthesis of **A** using the starting materials given and any other reagents that you may require. You do not need to show a retrosynthesis. **(10 marks)**