COMPLETE THIS SECTION: Up to TWO POINTS will be removed for incorrect/missing information!										
COMPLETE THIS SECTION: Up to TWO POINTS will be removed for incorrectimissing information:										
PRINTED FIRST NAME PRINTED LAST NAME										
Person on your LEFT (or Empty or Aisle)										
Person on your RIGHT (or Empty or Aisle)										
Class you are REGISTERED FOR (onground or hybrid)										
The room where most students will take the test for your class, i.e. LS A-191 for onground and PS H-152 for hybrid)										

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- PRINT YOUR NAME ON EACH PAGE!
- READ THE DIRECTIONS CAREFULLY!
- USE BLANK PAGES AS SCRATCH PAPER
- work on blank pages will not be graded...
- WRITE CLEARLY!
- MOLECULAR MODELS ARE ALLOWED

Ian R. Gould

- DO NOT USE RED INK
- DON'T CHEAT, USE COMMON SENSE!

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## YOU MUST COMPLETE THIS PAGE WITH YOUR NAME (EVEN THOUGH YOU ALREADY DID THIS ON THE COVER PAGE) AND ALSO GIVE YOUR ASU OR POSTING ID NUMBER WE NEED THIS NUMBER BECAUSE YOU WOULDN'T BELIEVE THE NUMBER OF STUDENTS WHOSE NAMES WE CAN'T READ!

PRINTED FIRST NAME	PRINTED LAST NAME		ASU ID or Posting ID		
	Points by que	estion			
	1	/22			
	2	/16			
	3	/16			
	4	/9			
	5	/8			
	6	/8			
	7	/32			
	8	/22			
	9	/20			
	10	/22			
	Points Removed for cover errors	s/2			
	Extra Credit	/5			
	Total (incl Extra)	/175+5			

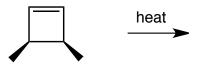
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Question 1 (22 pts.) Show how you would make the target compond on the right from the starting compound on the left. Show reagents and conditions where appropriate, and the structures of important intermediate compounds. Do not show any (arrow pushing) mechanisms. Ignore stereochemistry.



Question 2 (16 pts)

a) Give the curved arrow-pushing for the following electrocyclic ring opening reaction



- b) How many electrons are involved in the reaction? \_\_\_\_\_
- c) Will the ALLOWED reaction proceed via a Huckel or a Mobius transition state?
- d) Will the ALLOWED reaction proceed via conrotatory or disrotatory ring opening?

Question 3 (16 pts) Give the major organic products of the following reactions, indicate the stereochemistry using wedged/dashed bonds as appropriate and be sure to indicate the presence of any racemic mixtures.

- 3 -

a) 
$$\frac{1. \text{ MCPBA}}{2. \text{ MeOH/HCI (cat.)}}$$
b) 
$$\frac{\text{Na+-OEt}}{\text{EtOH}}$$

Qestion 4 (9 pts) Give the major organic product of the following reaction, indicate the stereochemistry using wedged/dashed bonds as appropriate and be sure to indicate the presence of any racemic mixtures. State whether a solution of the product(s) would be optically active or not, with a very brief explanation.

Qestion 5 (8 pts) Give the diene and dienophile that react to give the provided structure in a Diels-Alder reaction

Question 6 (8 pts.) Give the missing reagents/conditions to perform the following reaction

Question 7 (32 pts.)

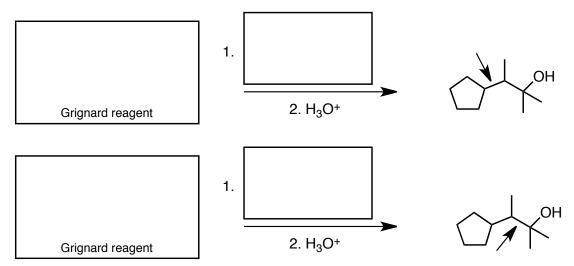
a) provide a curved arrow-pushing mechanism for formation of both products of the following reaction, indicate the Lewis acid/base at each step, LA/LB, and whether they are also Bronsted acids/bases, BA/BB. Show all important resonance contributors for the intermediates.

- b) give the number of steps in your mechanism for product A give the number of steps in your mechanism for product B \_\_\_\_\_
- c) Indicate which product would be formed under conditions of kinetic control and which would be formed under conditions of thermodynamic control, AND, which would be the major product at high temperatures AND at low temperatures, **give a BRIEF explanation**

## Question 8 (22 pts.)

a) For the C-C bonds in the provided structure indicated by the arrow, give the Grignard reagent and the structure it would react with to make that bond. Put the structures in the relevant boxes (the acid workup step is already included for you). Ignore stereochemistry in these problems.

- 5 -



b) BRIEFLY explain why the bond indicated in the structure below could not be made in a Grignard reaction

**X** 

Question 9 (20 pts) The following cation undergoes an electrocyclic ring closure reaction

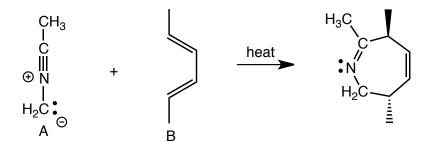
$$H_3C$$
 $H_3C$ 
 $CH_3$ 
heat
 $CH_3$ 

- a) Give the curved arrow-pushing and the product of the reaction, and indicate whether the product is achiral, a racemic mixture or a meso compound
- b) Draw the HOMO of the reactant on TOP OF THE STRUCTURE below

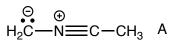
$$H_3C$$
 $\bigoplus$ 
 $CH_3$ 
 $CH_3$ 
 $CH_3$ 

c) Does the allowed reaction proceed via a conrotatory or a disrotatory ring closure?

Question 10 (22 pts.) In this question you are going to work out whether the reaction **SHOWN** would be allowed or forbidden *based on the rules for pericyclic reactions*For this reaction......



- a) Draw the arrow-pushing to account for the bond breaking/making
- b) Draw the HOMO of reactant **A on TOP of the structure re-drawn for you here**



- c) Draw the LUMO of reactant **B on TOP of the structure** re-drawn for you here
- d) Would an ALLOWED reaction between these two species be suprafacial/suprafacial or suprafacial/antarafacial?
- e) Would an ALLOWED reaction between these two species proceed via a Huckel or a Mobius transition state?
- f) Assuming the reaction is SUPRAFACIAL for reactant A, is THE REACTION SHOWN above allowed or forbidden?

Extra Credit (5 pts) Which of the following chemical properties enables the pharmacological activity of the drug olanzapine?

aromatic

non-aromatic

anti-aromatic