

Hour Exam #2 (AM)
Chemistry 343
Professor Gellman
31 October 2012

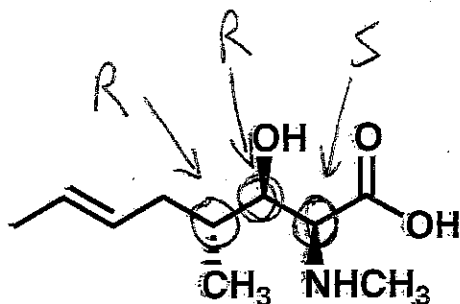
Last Name Answer

First Name Ken

General Instructions:

- (i) Use scratch paper at back of exam to work out answers; final answers must be recorded at the proper place on the exam itself for credit.
- (ii) Print your name on each page.
- (iii) Please keep your paper covered and your eyes on your own work. Misconduct will lead to failure in the course.

1. (9 points) The molecule shown below is a subunit found in cyclosporine, which is used to prevent rejection in transplant patients. CIRCLE each sp^3 stereogenic center (chiral center), and assign the configuration (R or S).



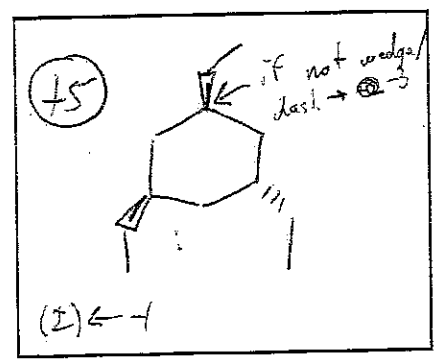
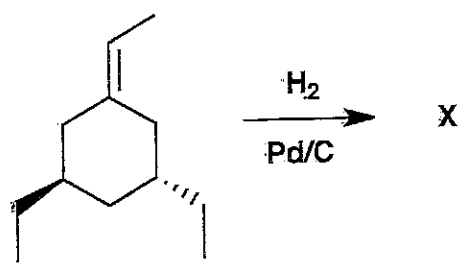
+1 for each correct circle

+2 for each correct R/S

-3 for any other carbon circled and labeled

2. (25 points)

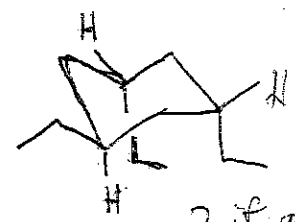
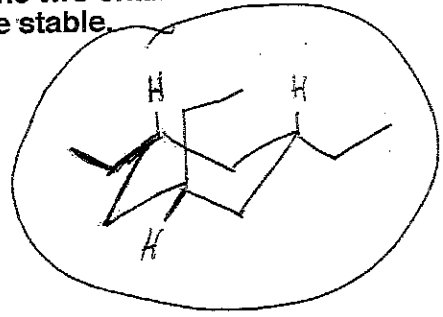
The reaction shown below produces only one product, X, whether the starting material is the single enantiomer shown or a racemic mixture. Provide the information requested below.



Note:
OK
(Same)

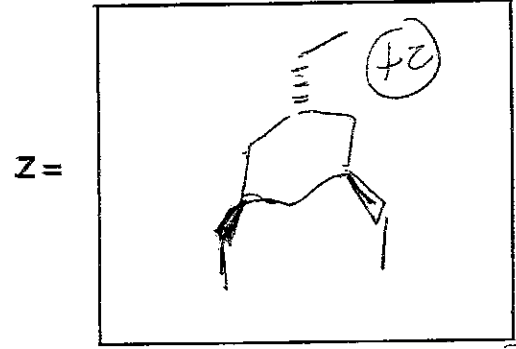
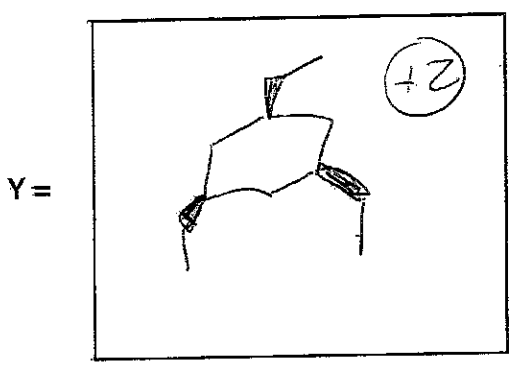
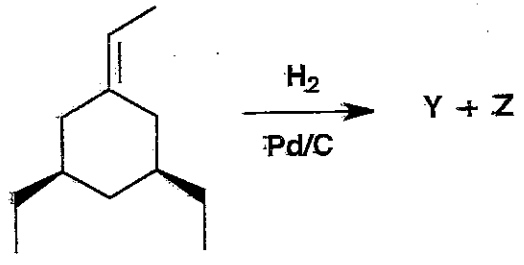
(a) Draw the structure of X in the box.

(b) Draw the two chair conformations available to X below, and CIRCLE the one you expect to be more stable.



+4 for each correct chair
+2 for correct circle
-2 if ax-ax-ax
-1 if e-CH₃ instead of Et
-2 for ambiguous ax/eq

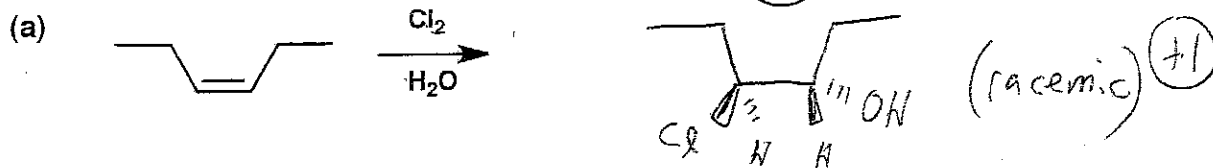
(c) The reaction shown below produces two products, Y and Z. Draw structures of these products in the boxes (the order does not matter). Under each box, indicate the stereochemical relationship of Y and Z (as you have drawn them) to X.



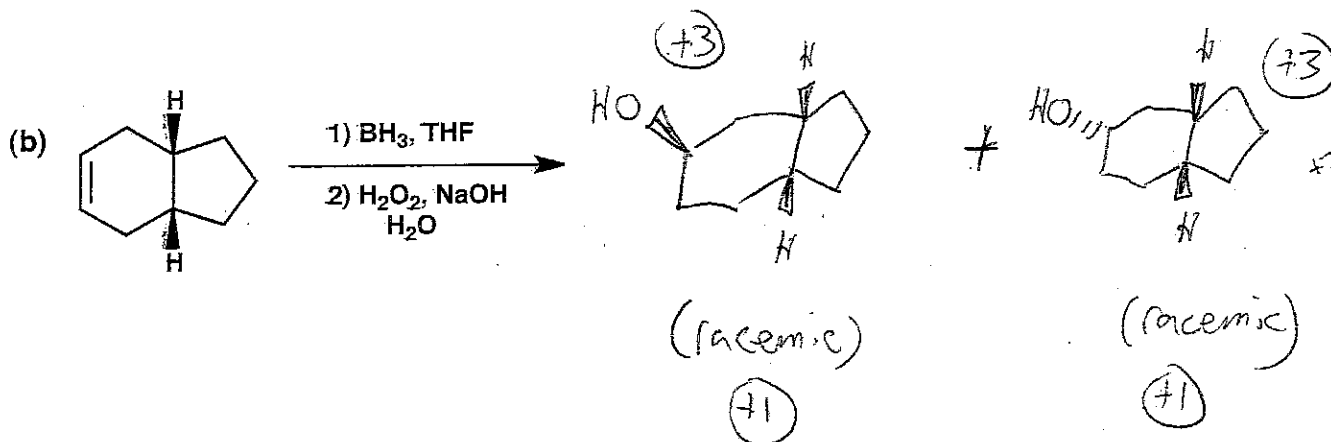
Relationship to X: Diastereomer (+3)

Relationship to X: Identical (+3)

3. (14 points) Show the major product(s) expected from the reactions below.

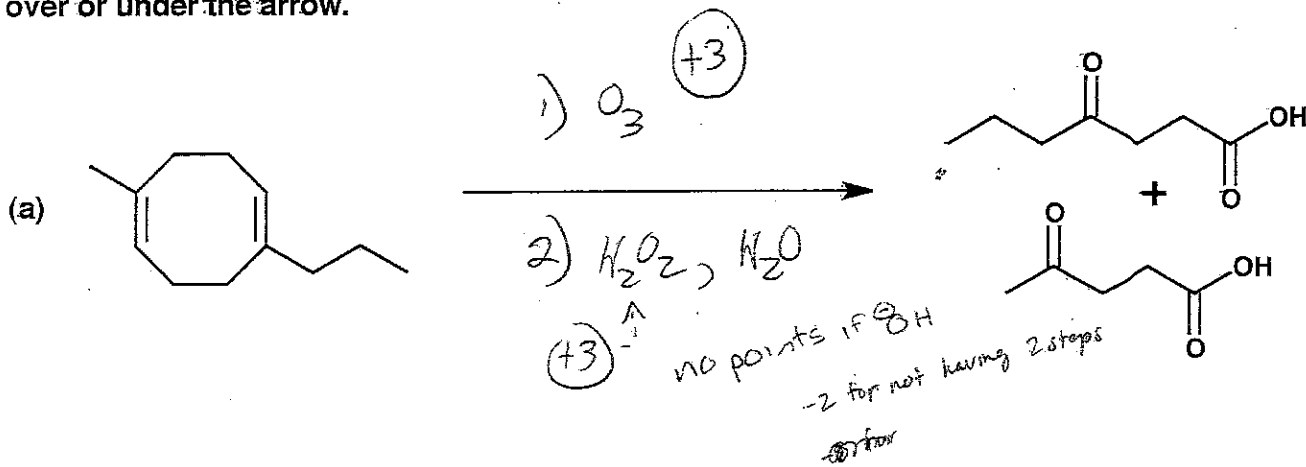


2/6 for syn
2/6 for no stereochem
2/6 for all the syn/anti
-1 for same thing twice



+2 if no stereochem

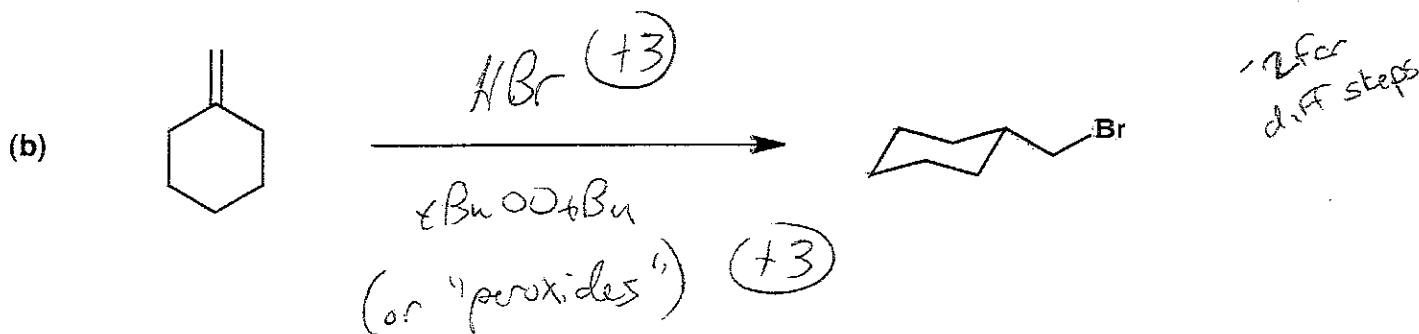
4. (12 points) Show the reagents required to convert the starting molecule to the indicated product. If necessary, differentiate clearly between distinct steps by using "1)", "2)", etc. over or under the arrow.



no points if OH

-2 for not having 2 steps

or

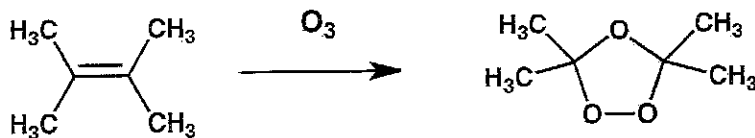


-2 for diff steps

5. (18 points)

Name _____

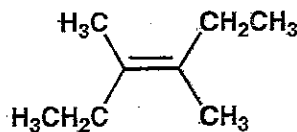
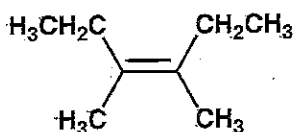
Background: Shown below the product that is isolated when the alkene below is allowed to react with ozone, but no additional reagents are used (as we discussed in lecture).



Question: When either of the alkenes shown below is allowed to react with ozone (only), three isomeric products are formed. The set of three products is the same, no matter which alkene is used as starting material.

Draw the structures of these three products in the boxes, and indicate the isomeric relationship between each one with the other two.

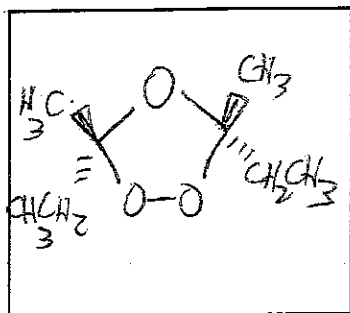
(**Note:** It does not matter how you place the products in boxes A, B and C, so long as the products are correct, and the relationships are correct.)



+0 for "flat"
structures

+0 for exact copies of structures

A

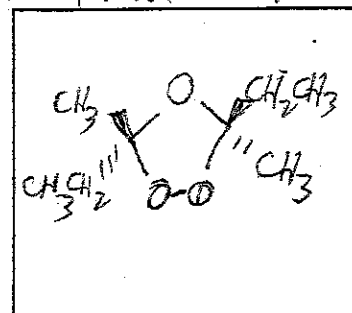


+2 for each correct structure

+2 for each correct relationship

C

(1 set of points if



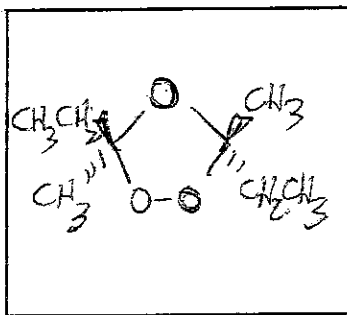
identified as "meso" for relative SMO

Rel. to B: Diastereomer

Rel. to A: Diastereomer

Rel. to C: Diastereomer

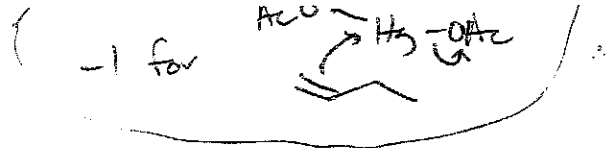
Rel. to C: Enantiomer



Rel. to A: Diastereomer

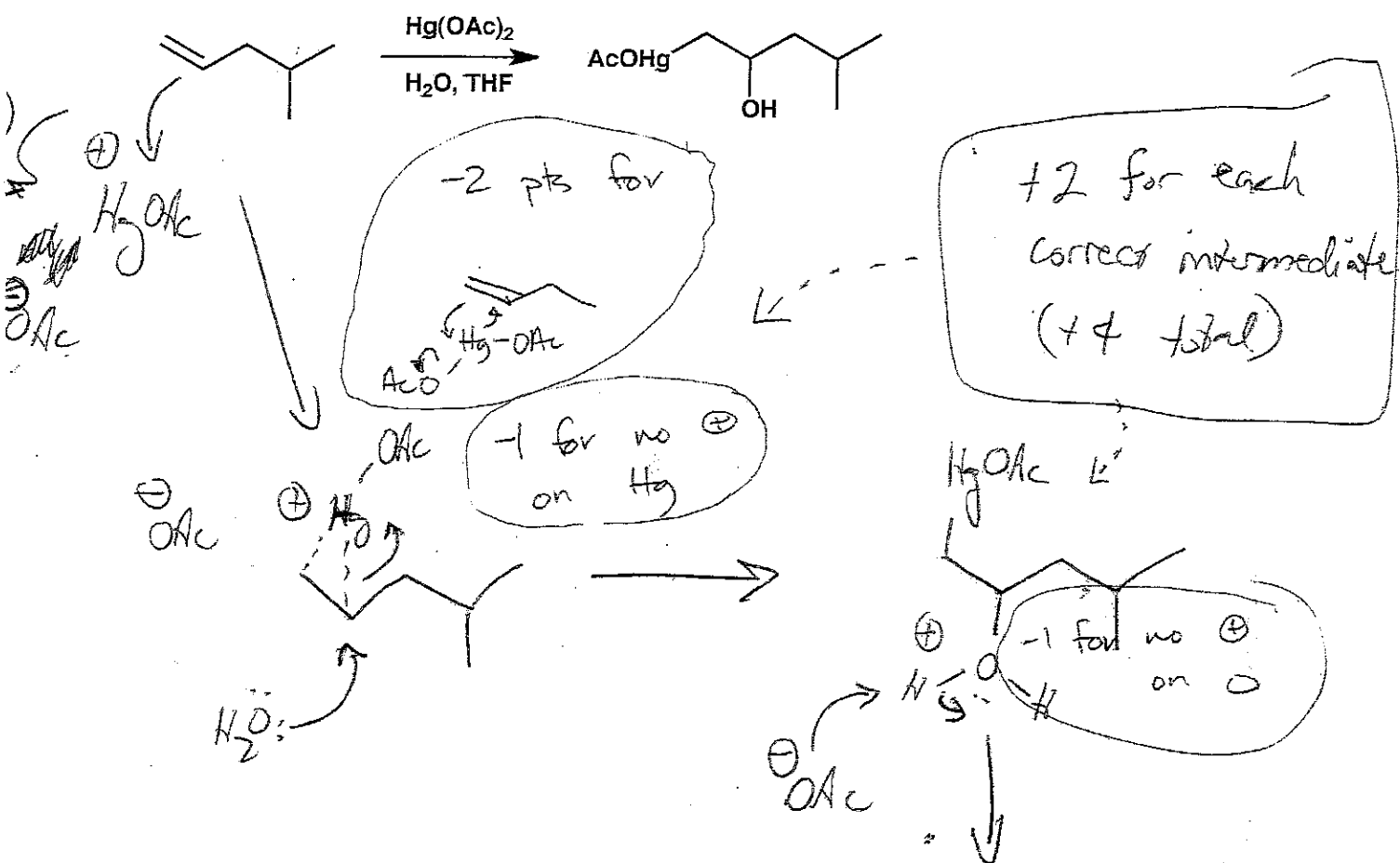
Rel. to B: Enantiomer

Take the rest of the relationships @ full value



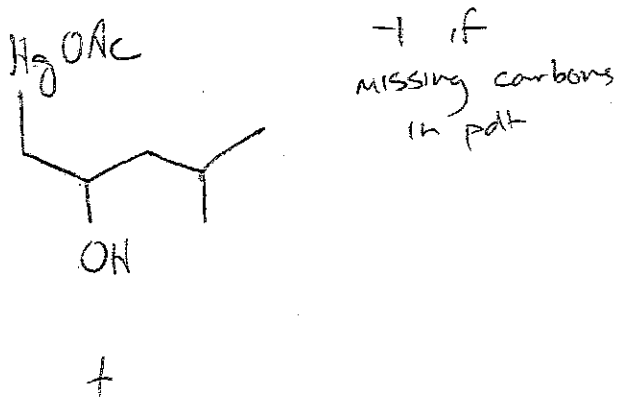
Name _____

6. (12 points) Draw a mechanism (curved arrows) for each reaction shown below. Be sure to draw all intermediates, and to indicate any by-products that may not be shown in the equation.



+1 for each correct curved arrow
(*5 total)

-3 pts total if H₂O used as base

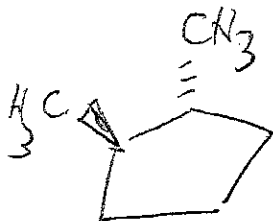
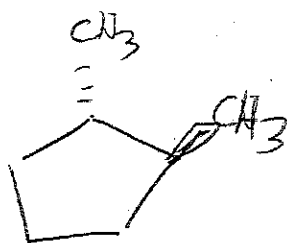


AcOH ← (+2)

-2 pts if is invoked at any time

Last Name _____

7. (10 points) Draw all chiral stereoisomeric forms of dimethylcyclopentane (C_7H_{14}).



For each enantiomer pair: +3 for one, +5 for both.

[~~4~~ for one and "racemic"]

-1 for each incorrect structure.