

# CHEMISTRY 112A FALL 2015

## EXAM 3

NOVEMBER 24, 2015

NAME- WRITE BIG \_\_\_\_\_

STUDENT ID: \_\_\_\_\_

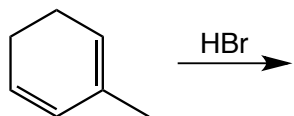
SECTION AND/OR GSI IF YOU ARE IN THE LABORATORY COURSE: \_\_\_\_\_

- 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

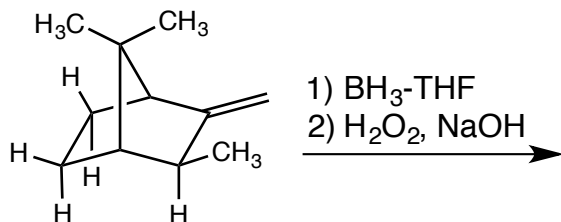
Problem	Points (Maximum)
1	25
2	15
3	18
4	25
5	10
6	12
7	15
<i>Total</i>	<i>120</i>

1. (25 points) For each reaction, draw the major organic products, **including all stereoisomers**. Write NR if you think there will be no reaction.

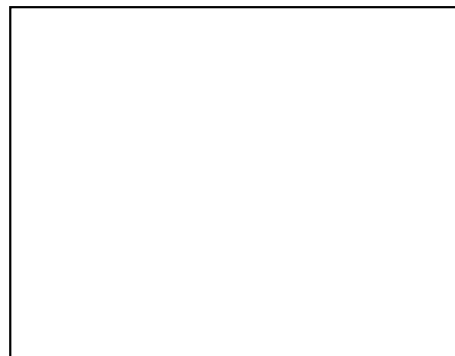
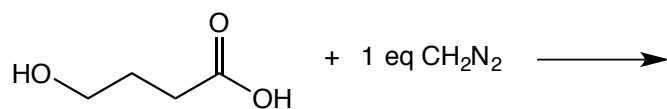
a. Indicate kinetic and thermodynamic products.



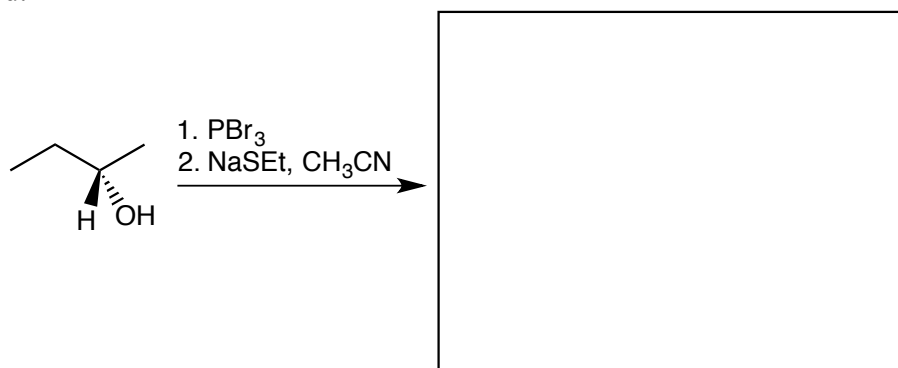
b. Draw the major stereoisomer



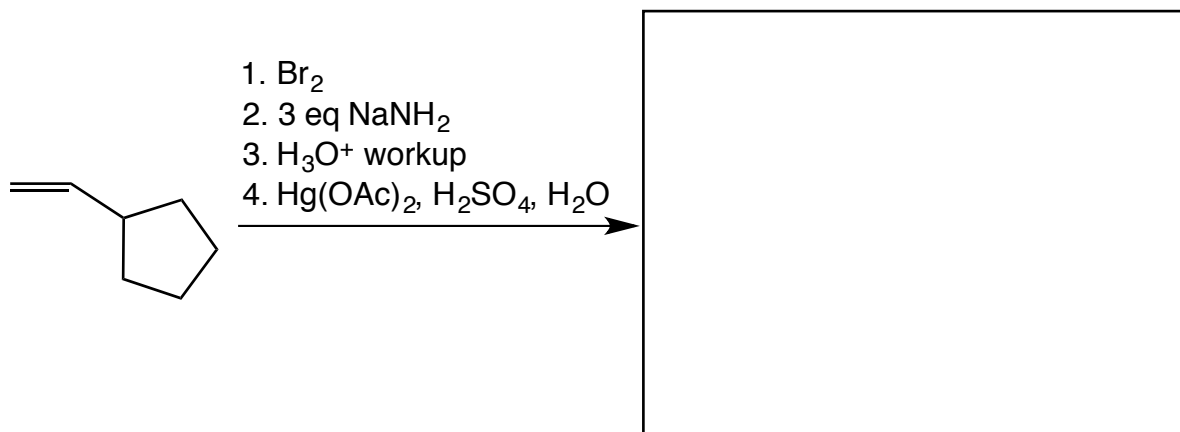
c.



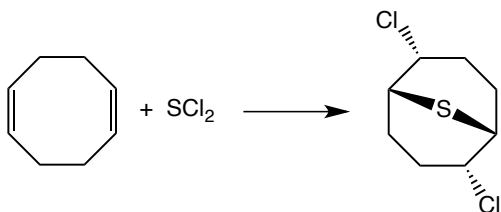
d.



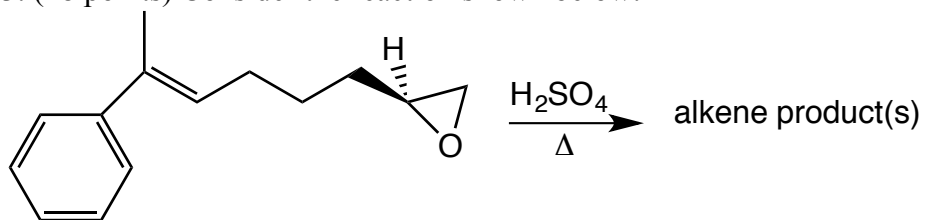
e.



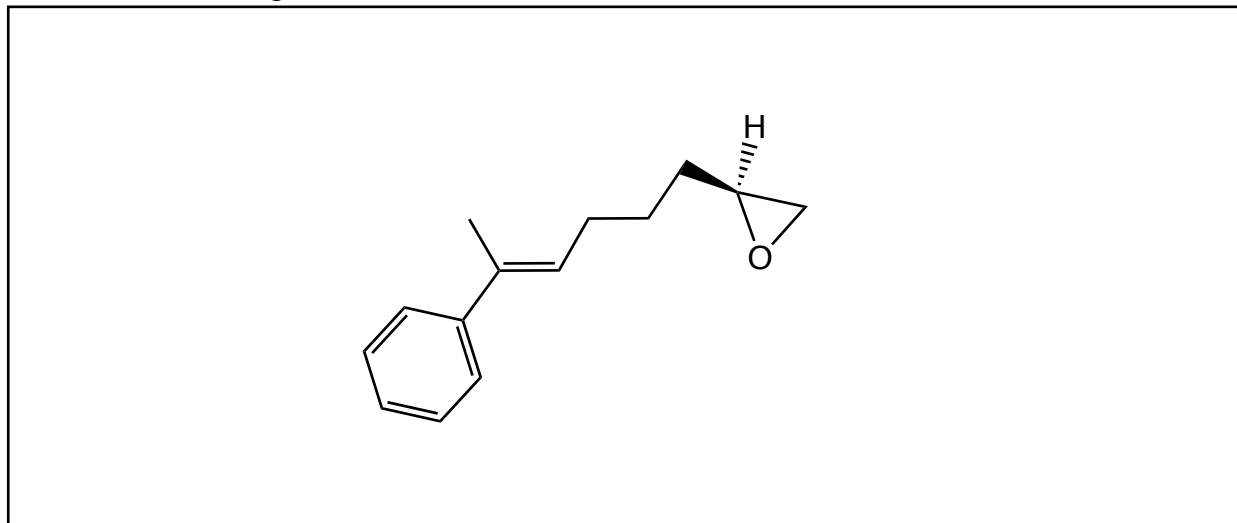
2. (15 points) Consider the following reaction, which produces the major product shown as a racemic mixture. Draw a mechanism for the reaction to **form the enantiomer shown** using arrows to show the movement of electrons.



3. (18 points) Consider the reaction shown below:



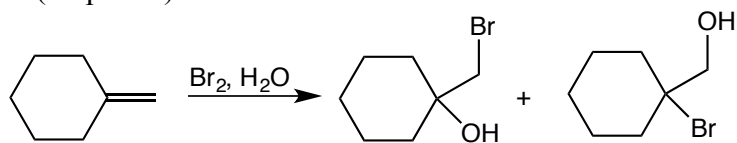
a. In the first step of this reaction, **the alkene reacts with the protonated epoxide**. Sketch the orbitals that are involved in this step of this reaction on the line drawing below. Label the orbitals and identify which orbital is acting as a Lewis acid and which as a Lewis base.



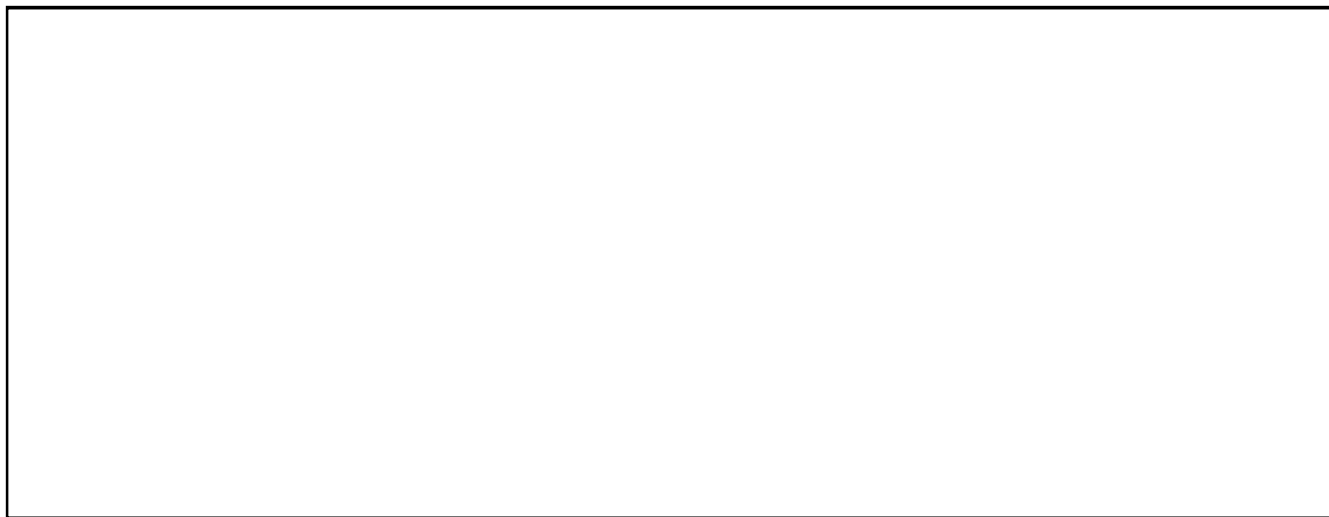
b. Draw a mechanism for the reaction using arrows to show the movement of electrons. Remember that the product(s) is an alkene.



4. (25 points) Consider the reaction shown below.



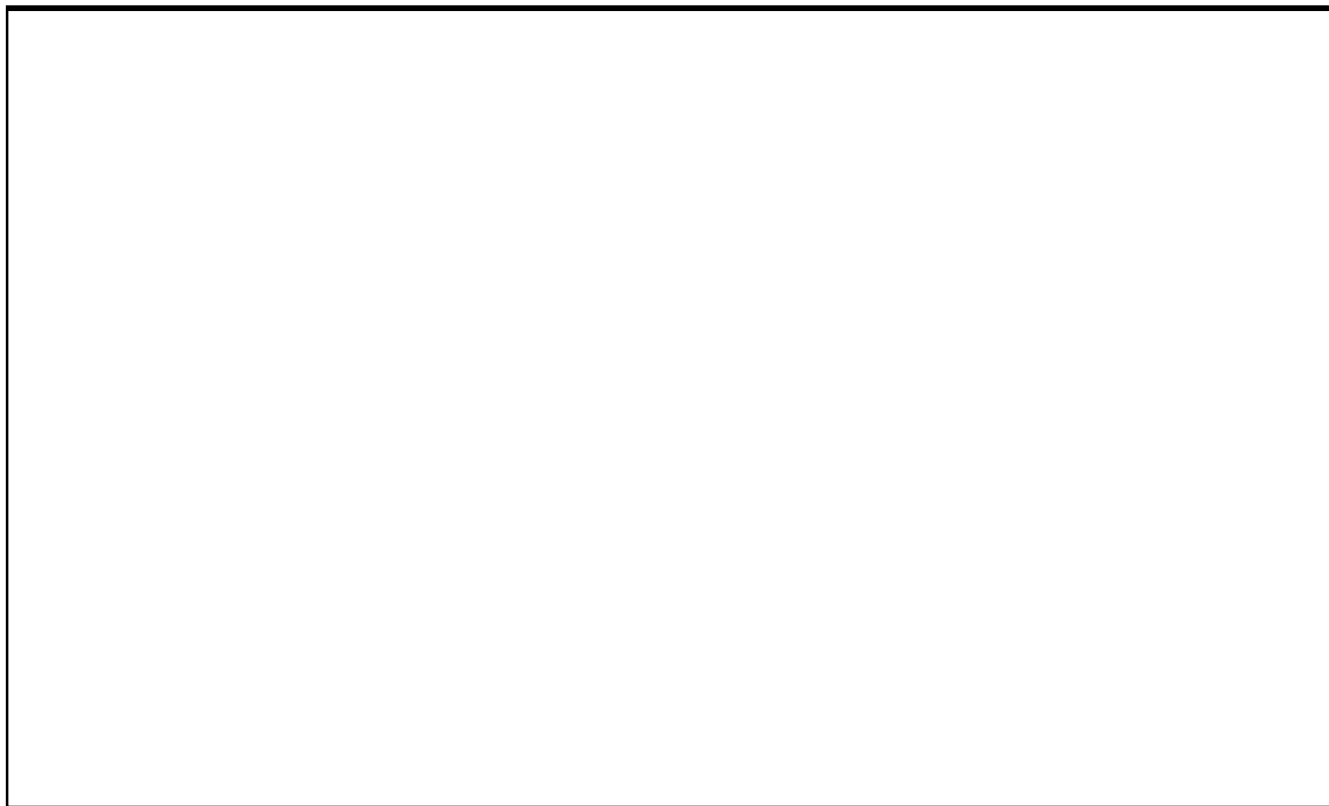
a. Draw the mechanism of the reaction to form both products using arrows to show the movement of electrons.



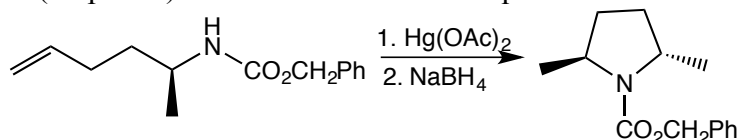
b. Which product do you expect to be the major product of this reaction? Explain why this product is the major product.



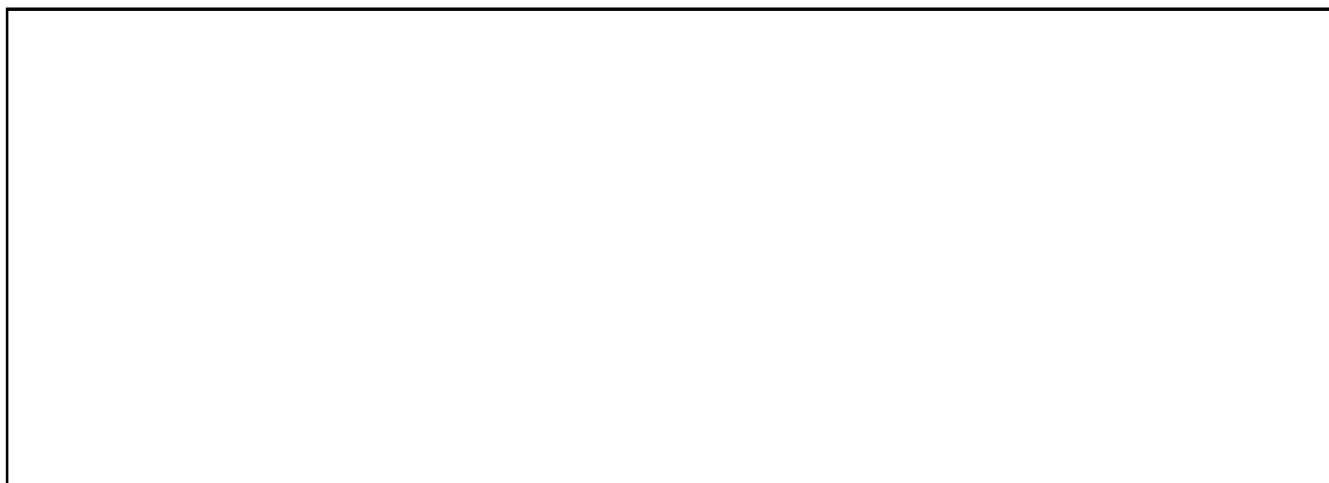
c. Draw a reaction energy diagram that shows formation of both products and illustrates your answer to part b. Include reactants, intermediates, and products. You may draw the products at equal energies in your answer.



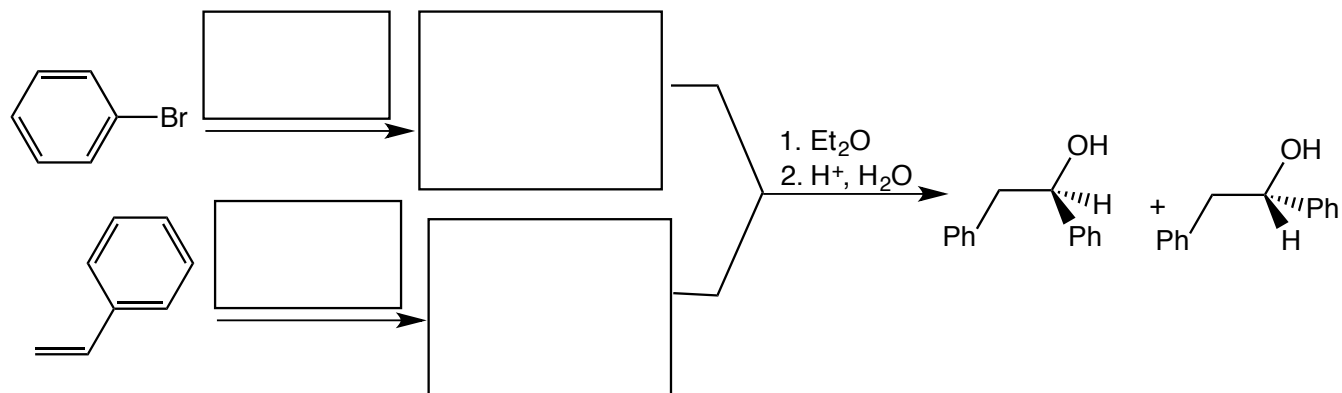
5. (10 points) Consider the reaction sequence shown below.



Draw a mechanism for the first step of the reaction sequence (with Hg(OAc)<sub>2</sub>) using arrows to show the movement of electrons. Make sure to show formation of the indicated stereoisomer. You do not need to draw a mechanism for the second step of the reaction sequence with NaBH<sub>4</sub>.



6. (12 points) Fill in the reagents and intermediates in the following synthetic sequence.



7. (15 points) Synthesize the following molecule using the indicated reagent and any other reagents. Draw the intermediates formed after each synthetic step. You do not need to draw the mechanism.

