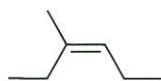


# Organic Chemistry

## CHM 223

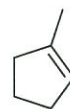
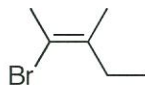
### Exam 3 Study Questions

Provide the correct IUPAC name for the following molecule:



Z-3-methyl-3-hexene

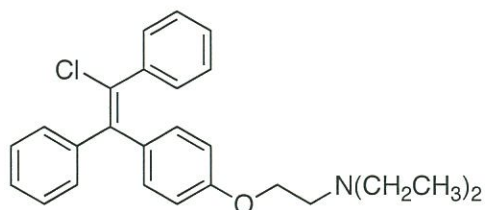
Assign appropriate IUPAC names to the following compounds. Make sure to use the correct *E/Z* assignments when assigning names, if required.



1-methylcyclopentene

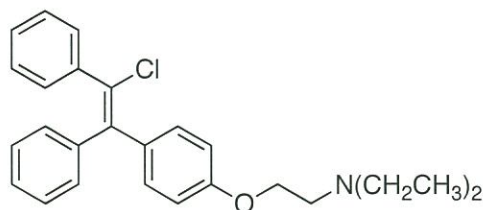
Z-2-bromo-3-methyl-2-pentene

The fertility drug clomiphene (trade name Clomid) is sold as a mixture of diastereomers, enclomiphene and zuclomiphene. Designate each alkene as an *E* or *Z* isomer.



enclomiphene

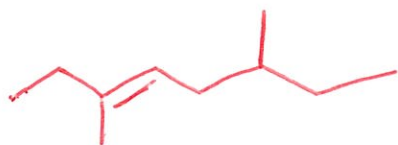
E



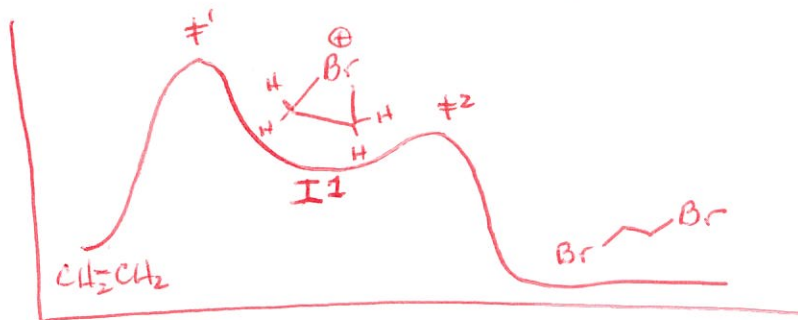
zuclomiphene

Z

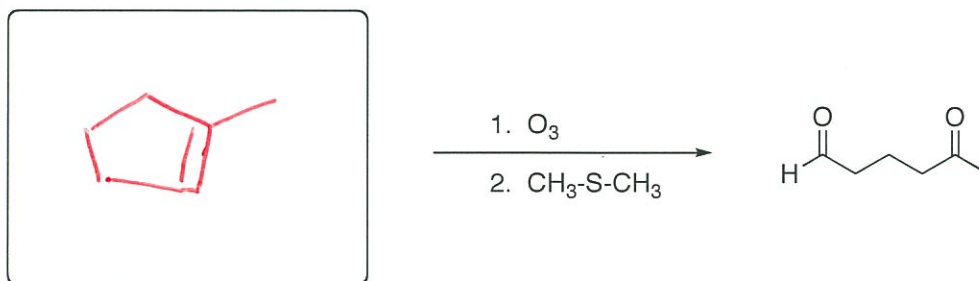
Draw the structure of (*E*)-3,6-dimethyl-3-octene



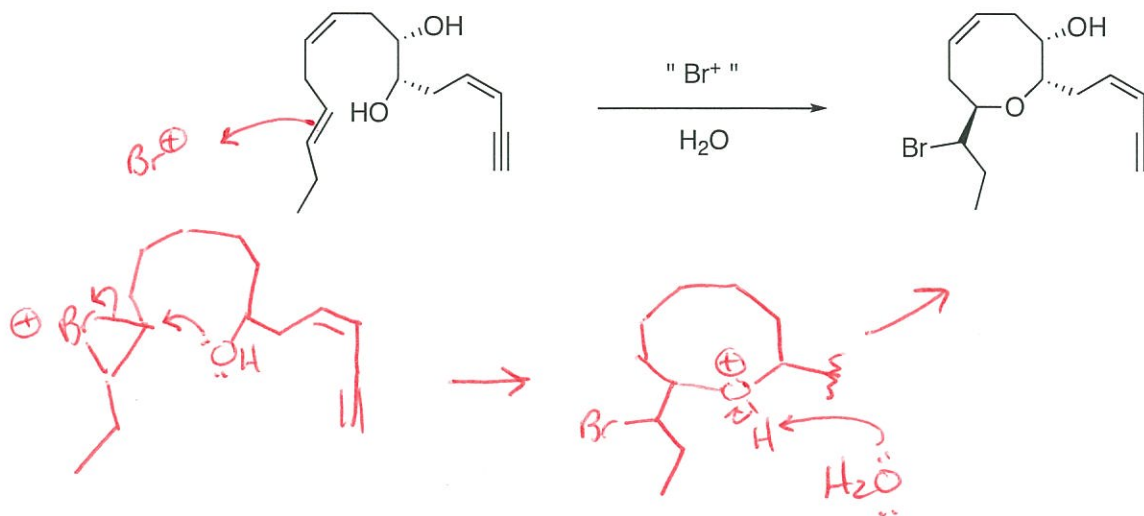
Draw an energy diagram for the two-step mechanism for the addition of  $\text{Br}_2$  to  $\text{CH}_2=\text{CH}_2$  to form 1,2-dibromoethane (assume that the reaction is exergonic). Label the starting material and product as well as any intermediates ( $\text{I}^1$ ,  $\text{I}^2$ , etc.) or transition states ( $\ddagger^1$ ,  $\ddagger^2$ , etc.).



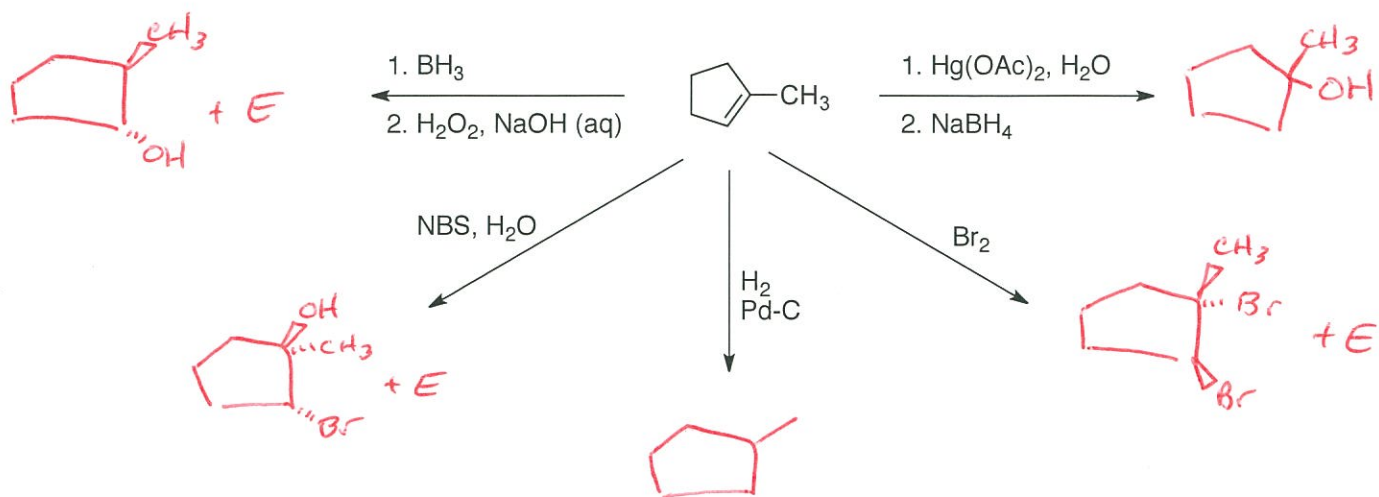
Draw the structure of the alkene that reacts with ozone followed by dimethyl sulfide to give the following product.



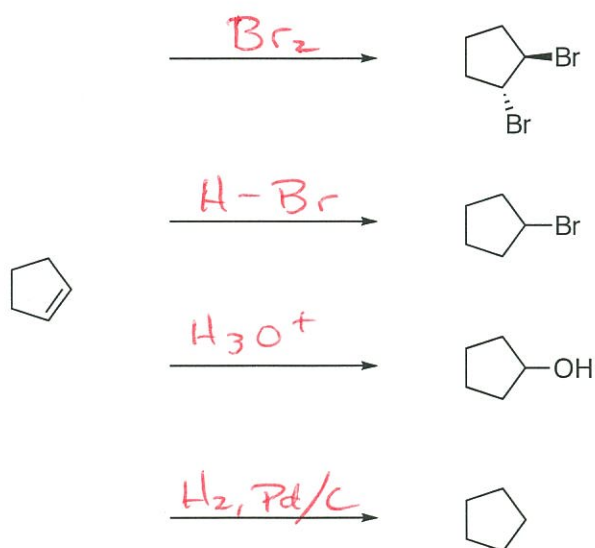
Isolated from marine algae, prelaureatin is thought to be biosynthesized from laurediol by the following route. Propose a mechanism. Hint: If you are looking for a base, assume there is LOTS of water around (since we're operating inside an organism).



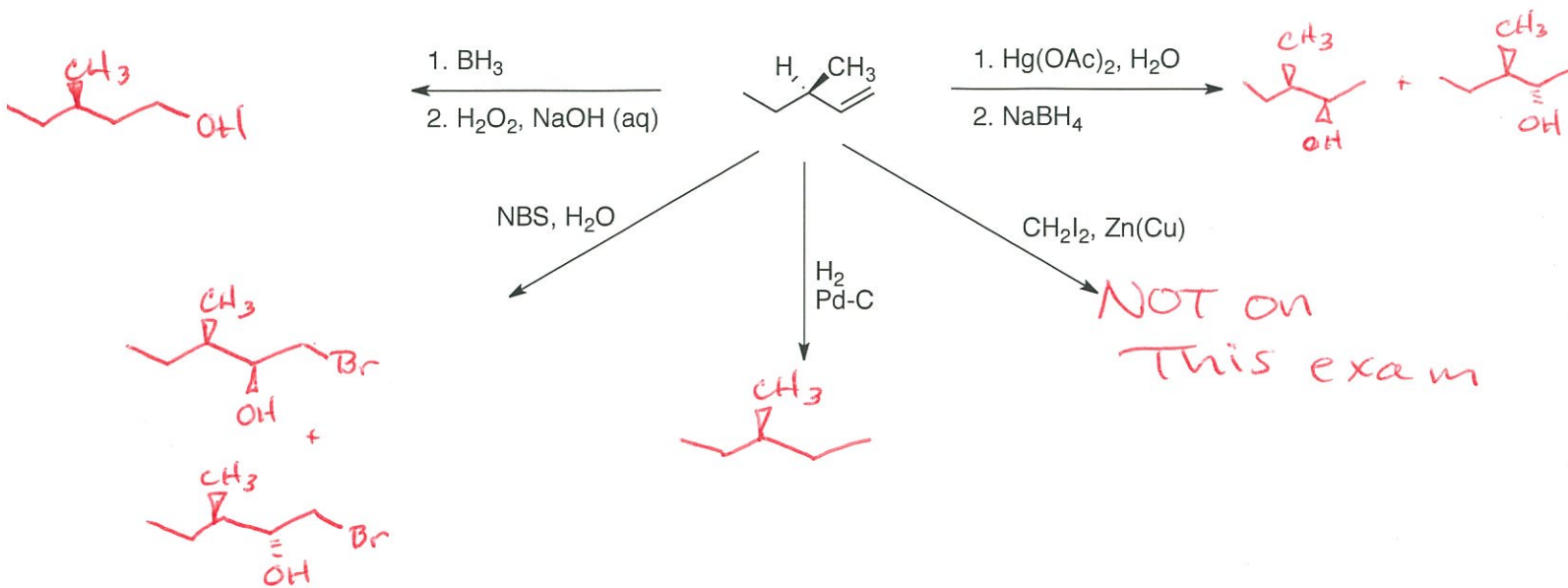
Draw the product of each reaction, below, making certain to show stereochemistry when relevant. If there are more than one product formed, are they enantiomers? diastereomers?



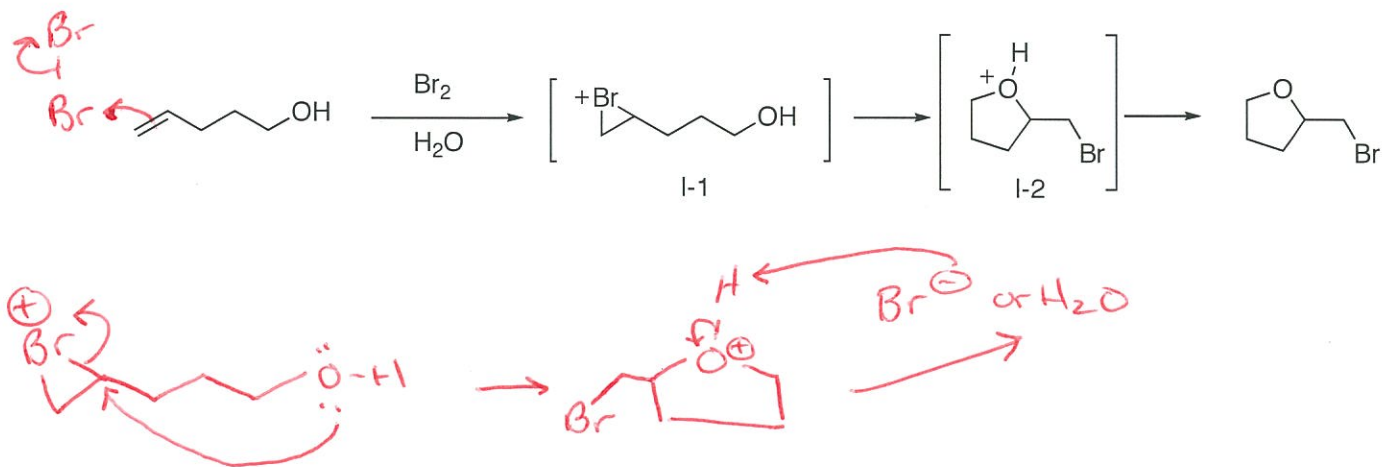
Show how to convert cyclopentene to the following 4 compounds by writing the appropriate reagent(s) at each reaction arrow. There may be more than one correct answer.



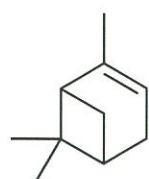
Draw the product of each reaction, below, making certain to show stereochemistry when relevant. If there are more than one product formed, are they enantiomers? diastereomers?



Draw an arrow-pushing mechanism that details each step of the following reaction:



How many degrees of unsaturation are found in pinene? You can either calculate it based on molecular formula or you can simply add them up by looking at the structure.

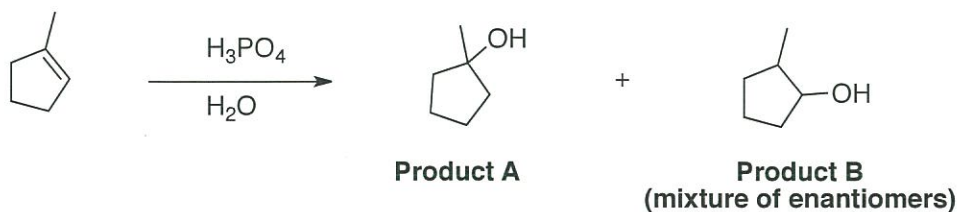


pinene

3 (2 rings, 1 pi bond)

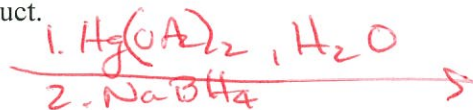
For questions 5 through following questions, answer "A" or "B".

The reaction of the following methylcyclopentene with phosphoric acid in water gives one of the two products below as the major product (and the other is formed in only small quantities). Answer the following question(s) about this reaction.

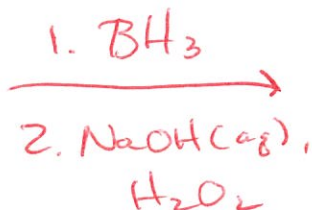


5. Which would be the major product? **A**
6. Which product would be formed via a tertiary carbocation? **A**
7. Which product would have a higher energy first intermediate? **B**
8. Which product is the anti-Markovnikov product? **B**
9. Which product would be formed by a carbocation experiencing the greatest degree of hyperconjugative stabilization? **A**

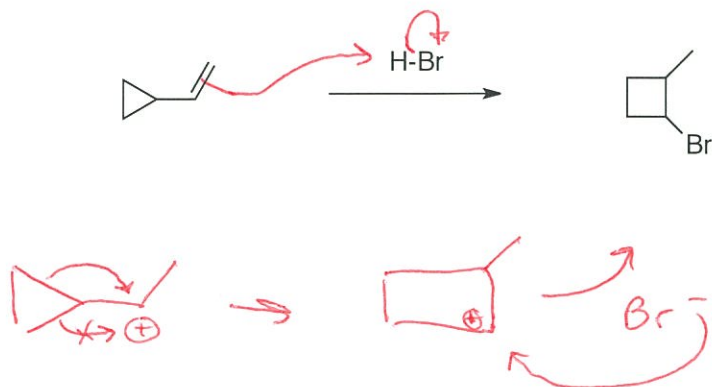
10. Suggest an alternative set of reagents (not acid and water) that would produce **product A** as the major product.



11. Suggest a set of reagents (not acid and water) that would produce **product B** as the major product.



Vinylcyclopropane reacts with HBr to yield the product shown below. Draw a stepwise, arrow-pushing mechanism that accounts for the following conversion. Make sure to show all electron flow with arrows and include all intermediate structures.



The following reaction converts an epoxide into a bromohydrin. It consists of two steps, shown below.

- For each step, draw an arrow-pushing mechanism that accounts for the observed reaction.
- For each step, label the nucleophile and the electrophile
- These two steps, together represent (circle one)
  - an elimination reaction
  - an addition reaction
  - a rearrangement
  - a substitution reaction

