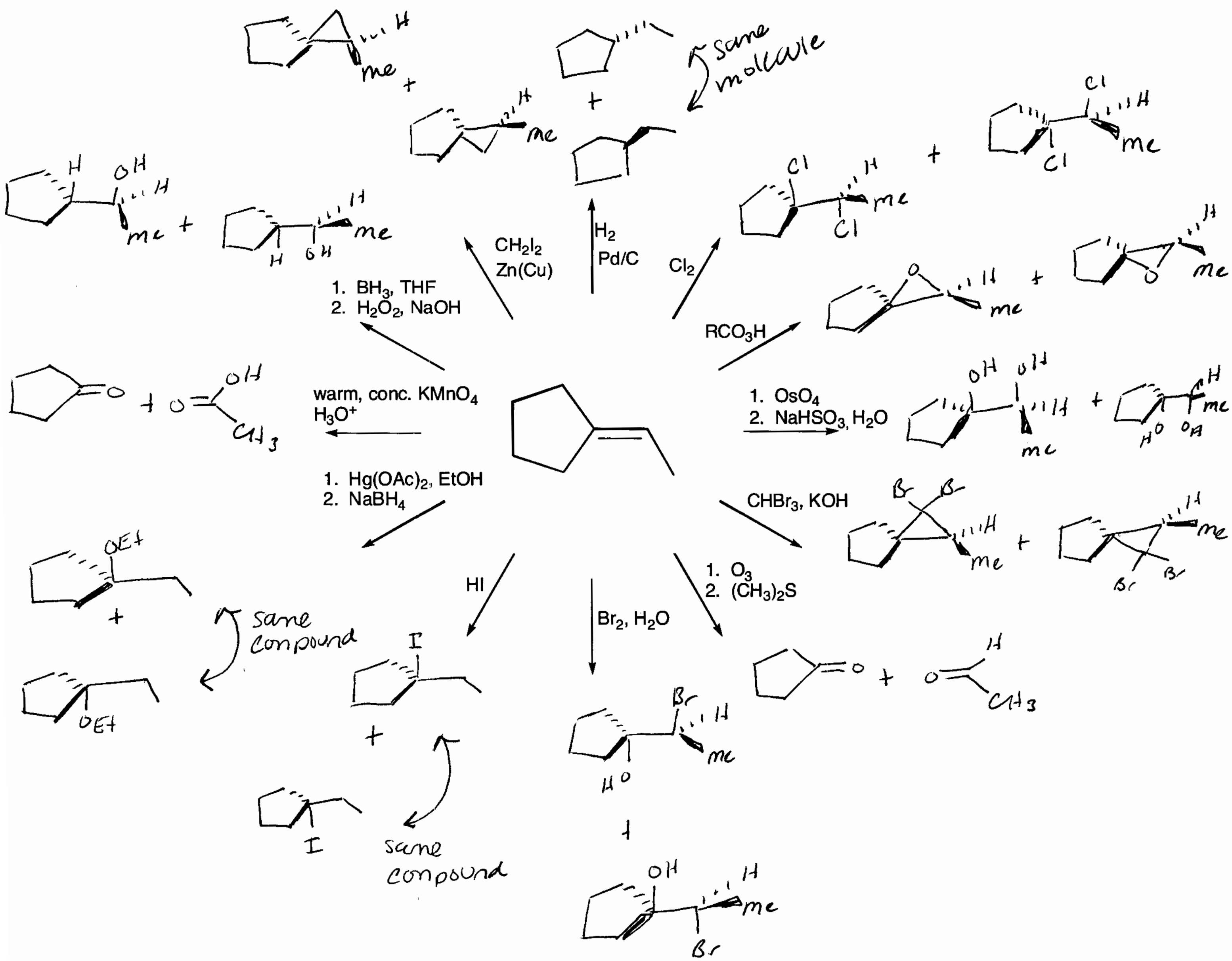
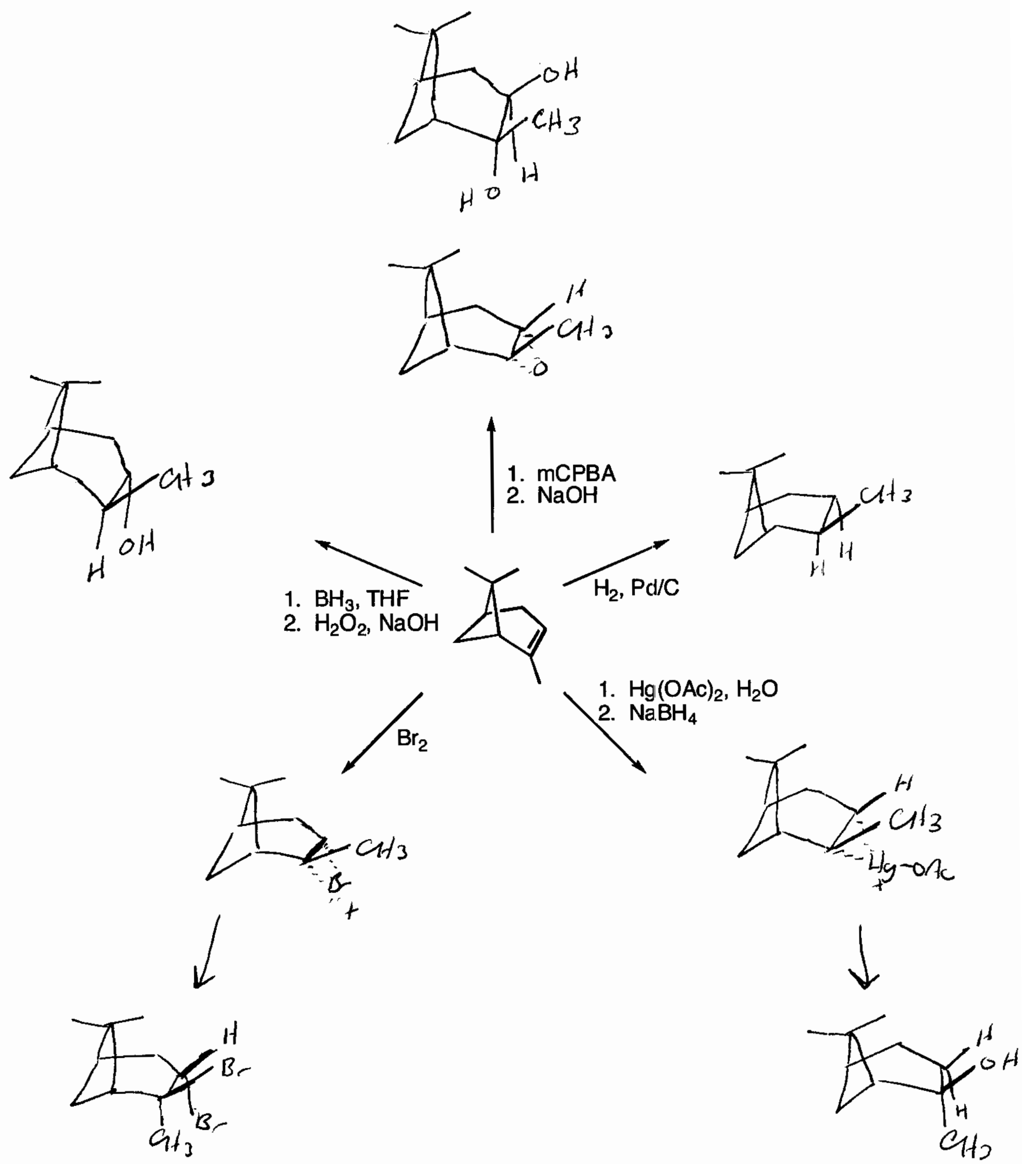
Problem Set #4
Due: March 10, 4:00 pm

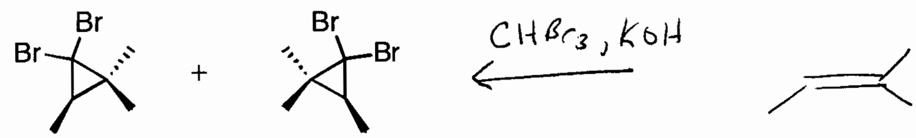
1. Provide the product of each reaction shown below. Include stereochemistry.

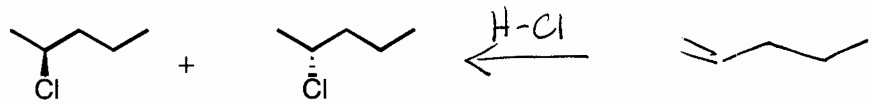


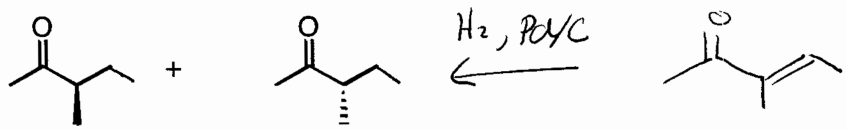
2. Provide the major product of each reaction.

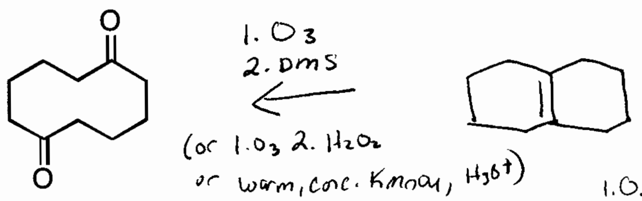


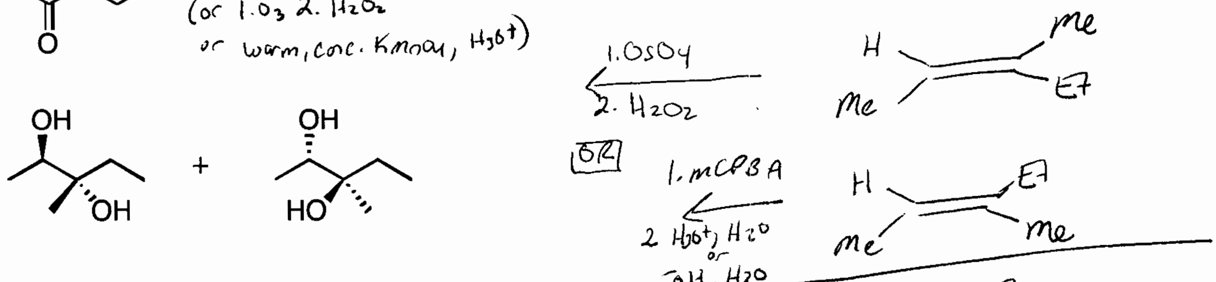
3. Provide the best alkene starting material and reagents required to form each product.

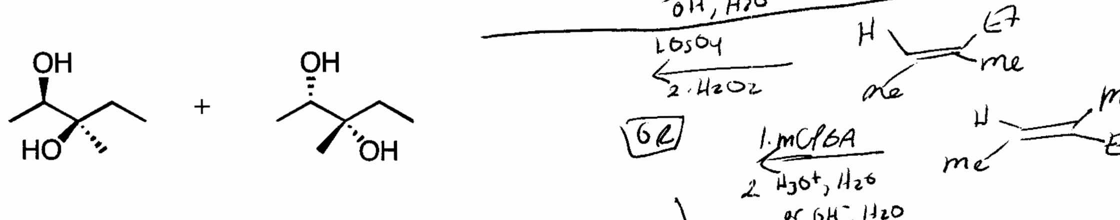
a) 

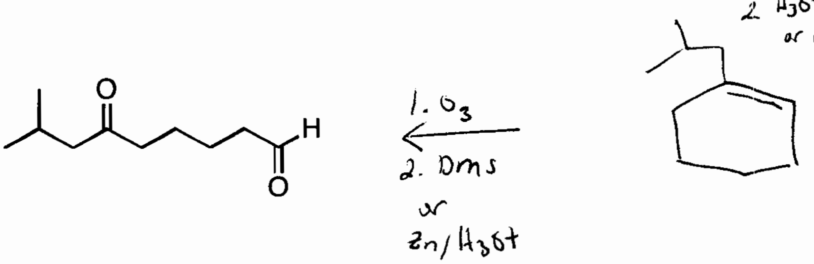
b) 

c) 

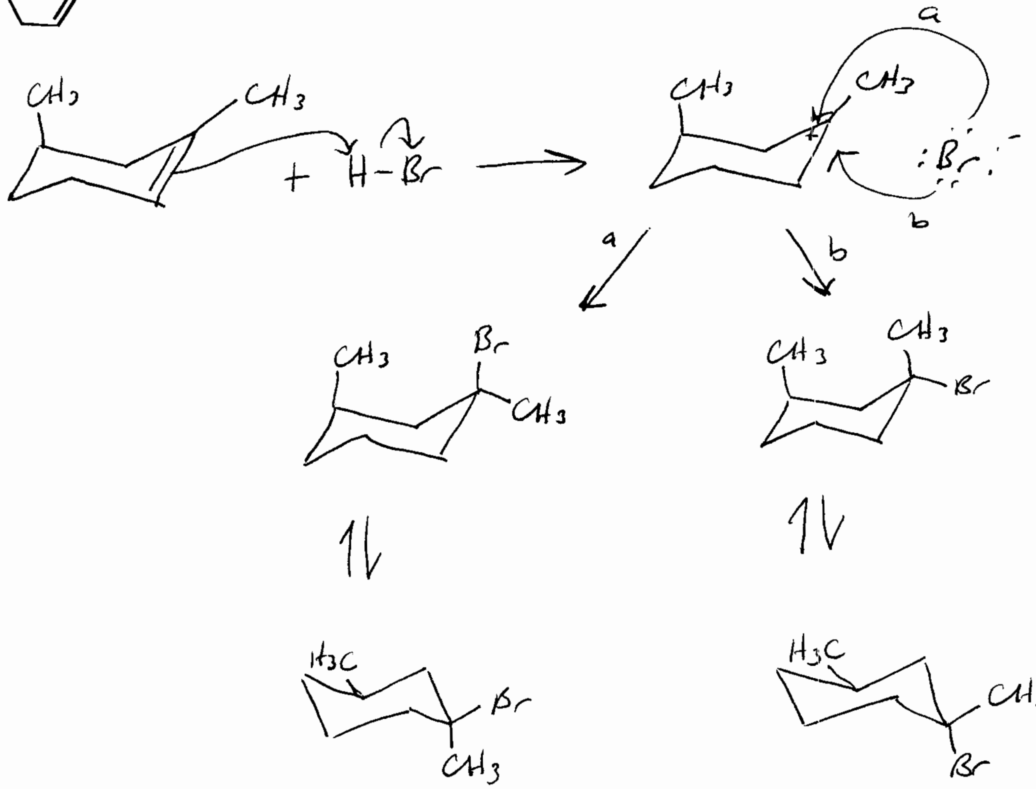
d) 

e) 

f) 

g) 

4. Provide all the possible products for the following reaction. Which product is more stable and why?

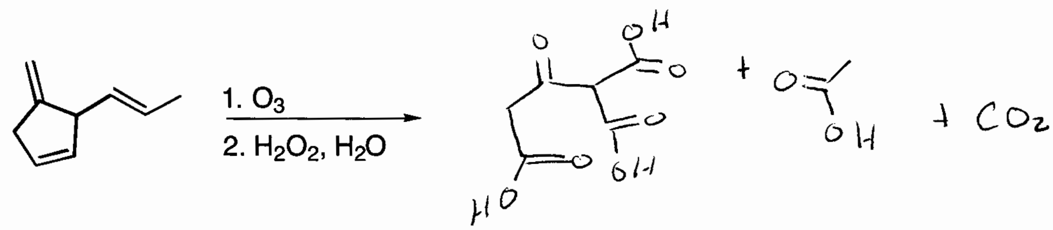


less stable product
Me is axial, has larger A value than Br

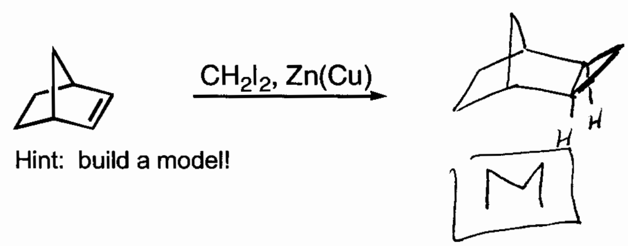
most stable product
2 methyl groups are equatorial + bromine is axial
Br has a lower A value than CH_3

5. Provide all stereoisomers that result from the following reactions. For b-f, indicate if the products are optically active (C), optically inactive/racemic (R), or optically inactive/meso (M).

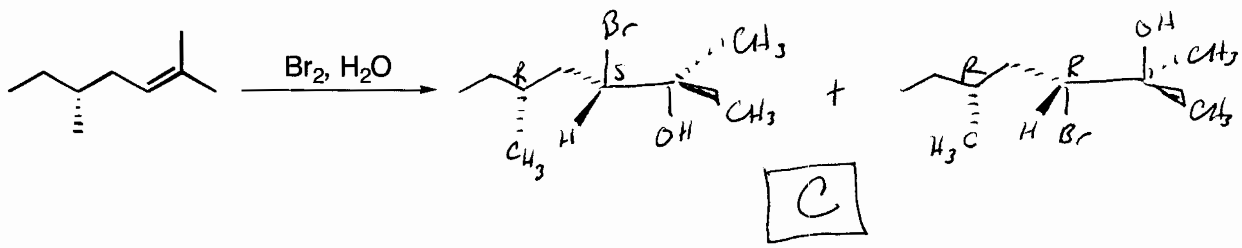
a)



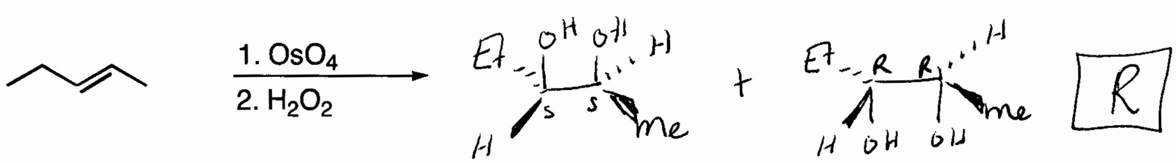
b)



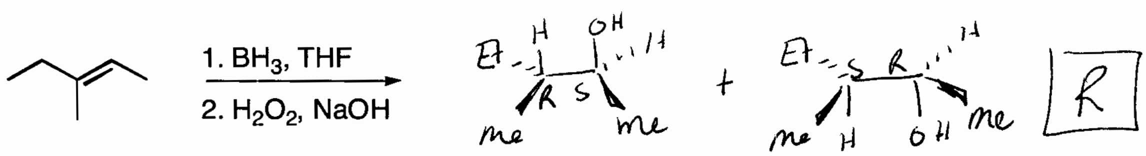
c)



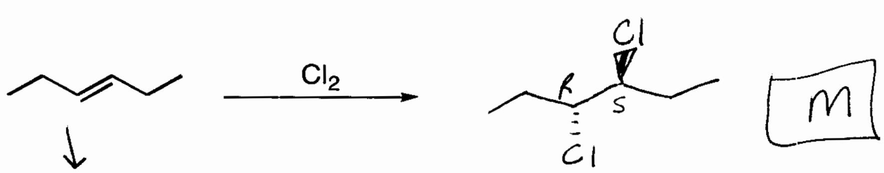
d)

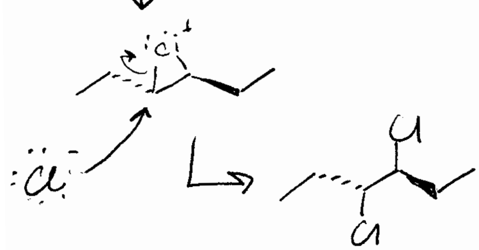


e)



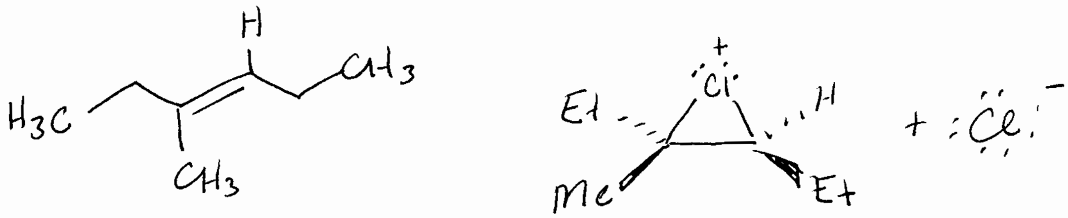
f)



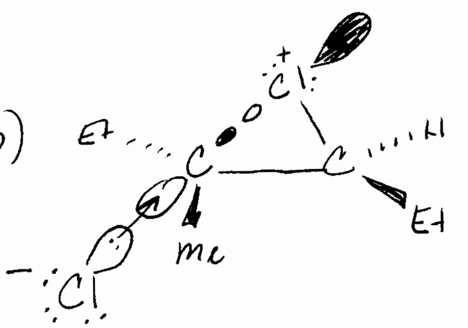


6. **a)** Draw the intermediate that results from the reaction of Cl_2 with (*E*)-3-methyl-3-hexene. **b)** Show the initial orbital overlap for the second step of this reaction. **c)** Explain why the nucleophile attacks the more substituted atom in the second step by drawing transition states.

a)



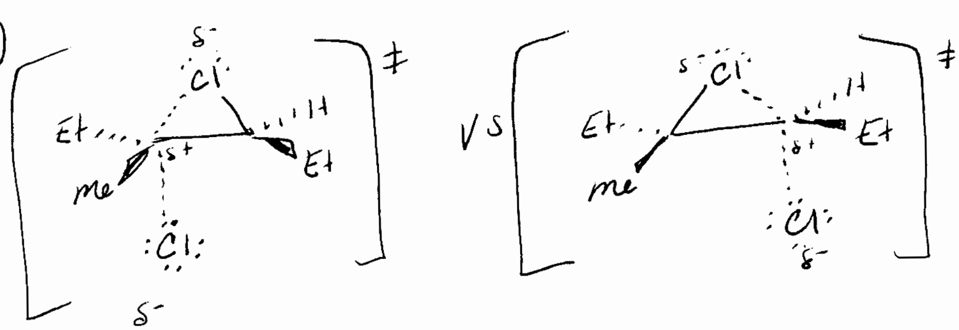
b)



n + σ*

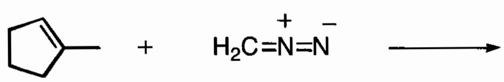
backside attack

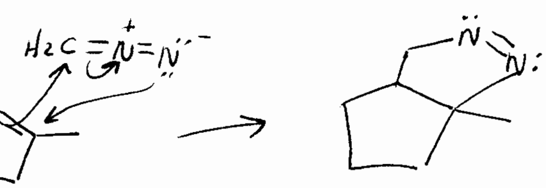
c)



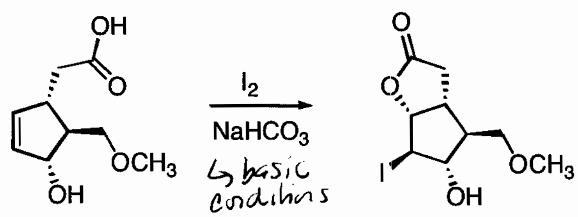
partial positive change that develops is stabilized by more substituents

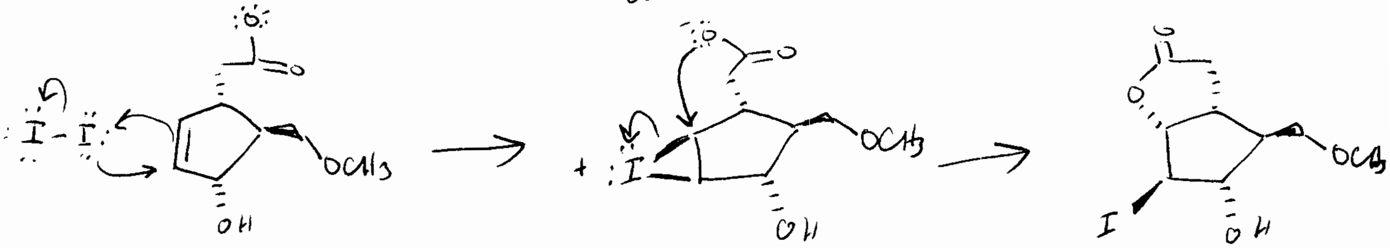
7. Using what you know about the first step of ozonolysis, show the mechanism and product for the following reaction.





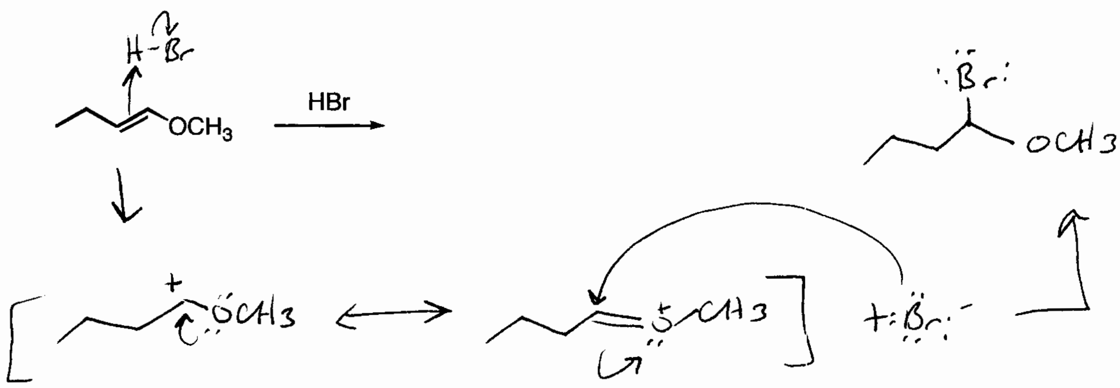
8. Lactones, or cyclic esters such as the starting material shown below, are prepared by halolactonization, an addition reaction to an alkene. The following lactonization is a key intermediate in the synthesis of prostaglandin $PGF_{2\alpha}$. Draw a stepwise mechanism for this addition reaction.



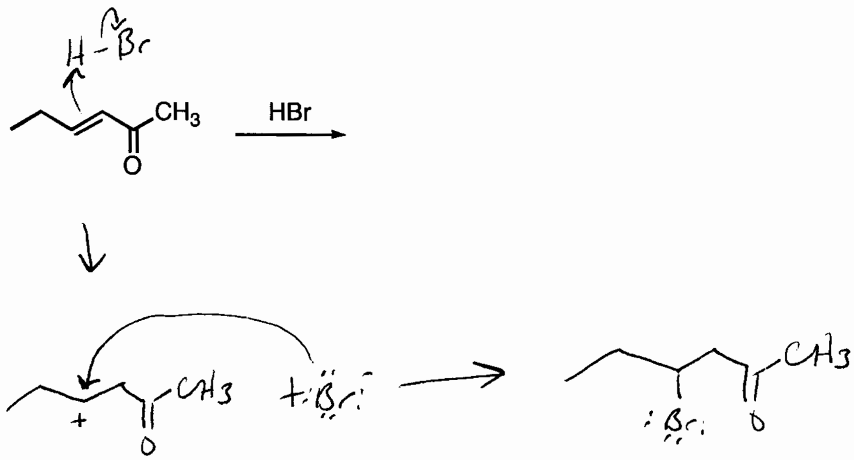


9. Show the mechanism for each reaction. Ignore stereochemistry.

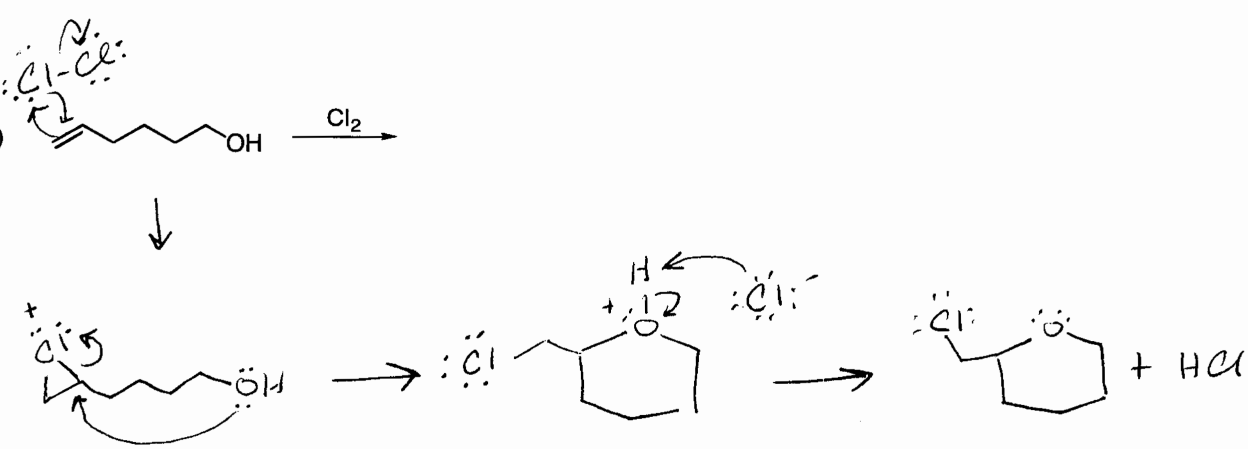
a)



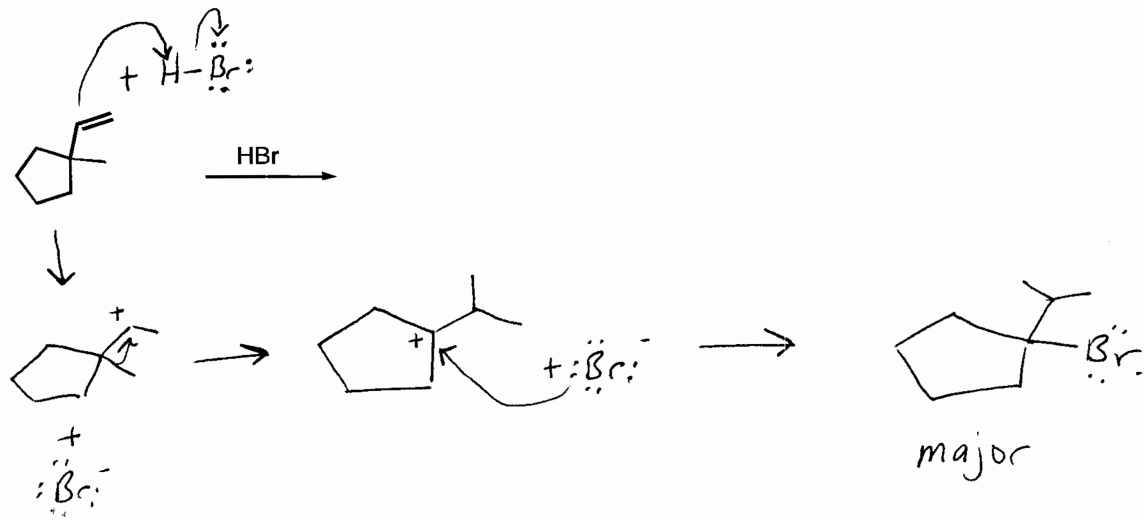
b)



c)



10. Show the mechanism and major product for each reaction.

a) 

b)