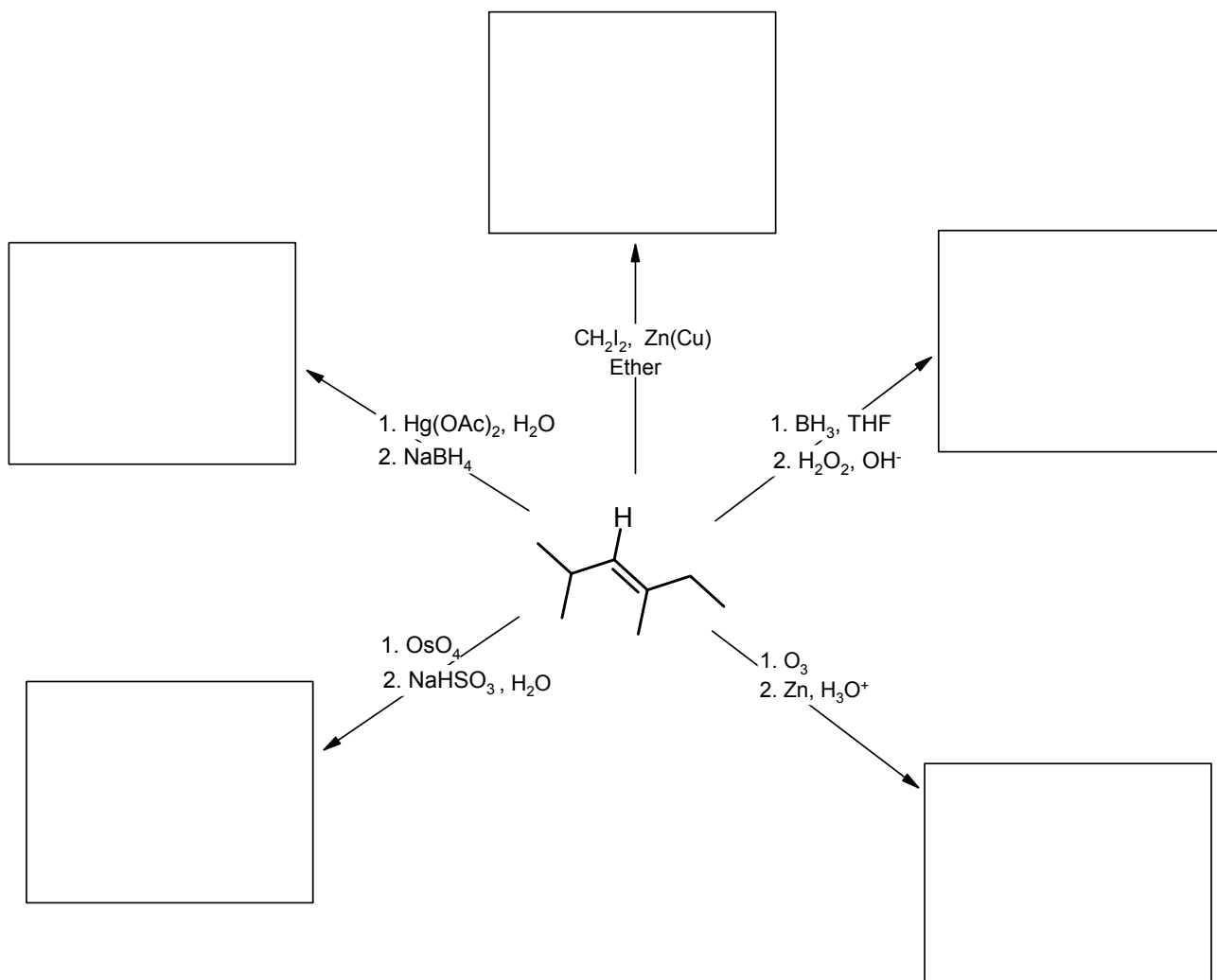


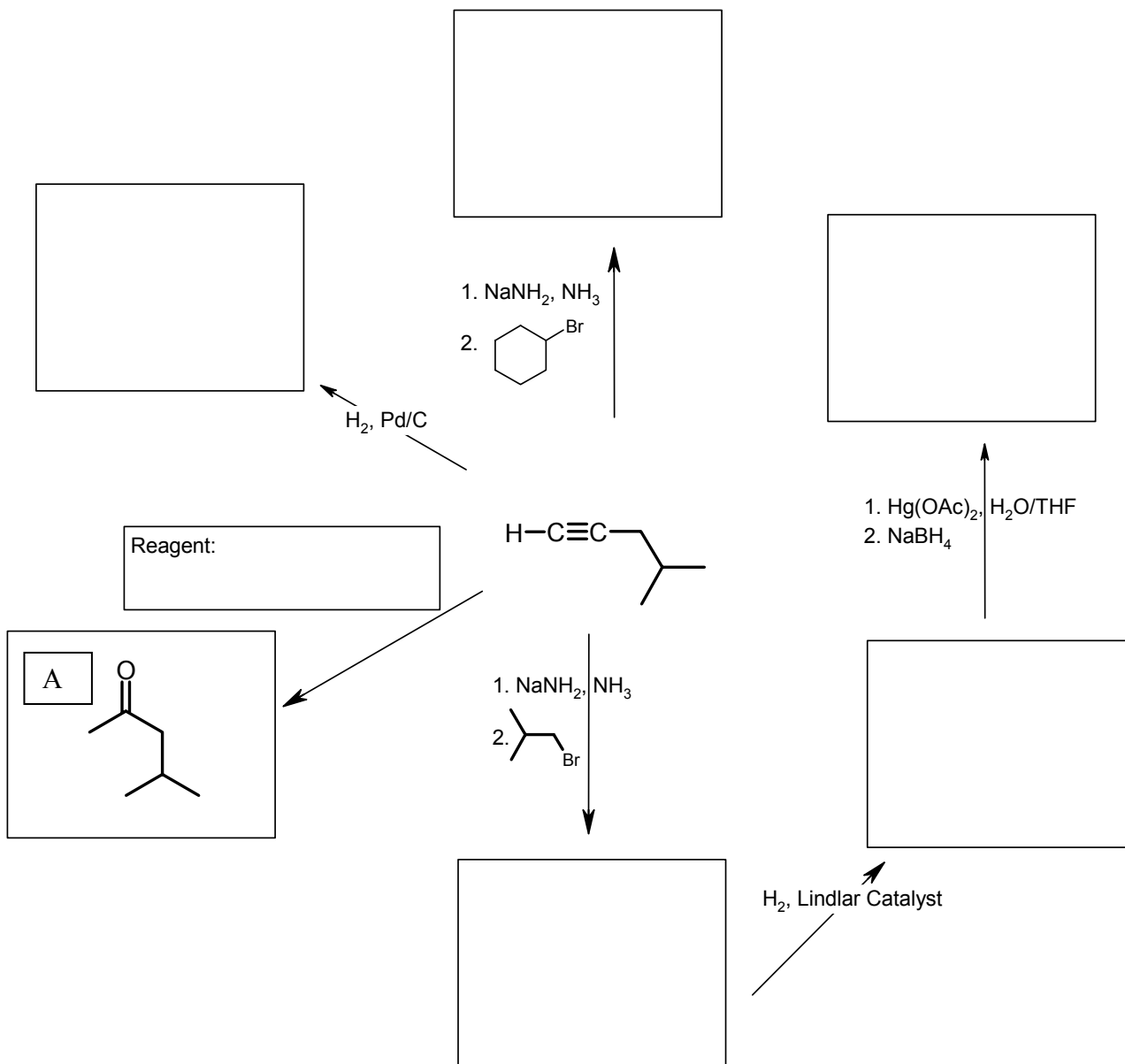
Name _____

1. (15 points) Predict the products of the following reactions. Show relative stereochemistry (only one stereoisomer) where appropriate.



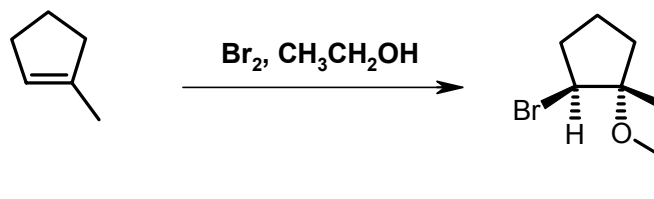
Bonus: (3 points) Provide a name for any three reactions shown above, such as hydroboration (write the names above the appropriate reaction)

2. (18 points) Provide the starting material, products or reagents for the following reactions.



Bonus: (6 points) Draw the enol that leads to the ketone (A) shown above. What is this process called? Provide a mechanism for the reaction.

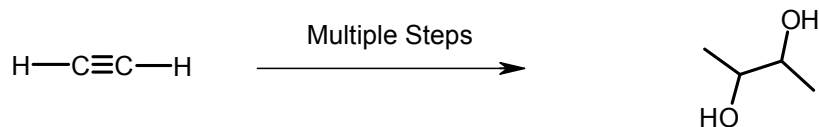
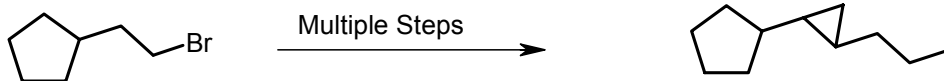
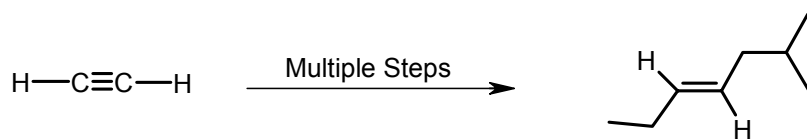
3. (10 points) a) Provide a step-by-step mechanism that explains the formation of the product shown and clearly indicate stereochemistry at each step.



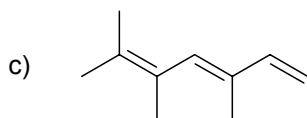
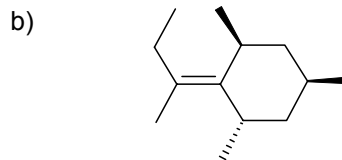
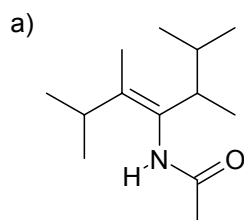
b) Is the product shown a result of Markovnikov or anti-Markovnikov addition? Which would be favored and why?

c) What factors influence carbocation stability?

4. (24 points) Provide a reasonable synthetic scheme for making the following compounds with the correct stereochemistry from the indicated starting materials. Each synthesis requires several steps. **Please show the structures of all the intermediate compounds.**



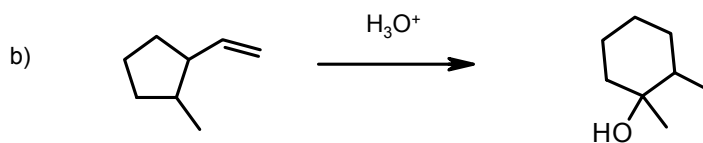
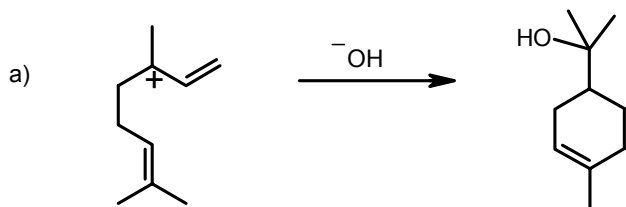
5. (8 points) Identify all (a-c) of the following compounds as E or Z isomers. Provide the standard IUPAC name for (c) and also, draw the structure corresponding to (d).



d) Draw (4E)-2,4-dimethyl-1,4-hexadiene

Name:

6. (20 points) Provide a plausible (you are trying to explain how the product is formed) curved-arrow mechanism for the following reactions as shown below. Show every mechanistic step clearly and number the carbon atoms in both starting material and product.



7. (5 points) Provide compounds (draw the compounds and circle the acid H) with pKa values of 4, 10, 16, 25, and 60

Bonus (8 points) Please try this only after you have finished the exam.

Compound A (C_9H_{12}) absorbs 3 equivalents of H_2 on catalytic hydrogenation to give compound B (C_9H_{18}). Upon ozonolysis, compound A gave several different products, one of which was identified as cyclopentanone. Compound A reacted with $NaNH_2$ in NH_3 , followed by addition of 1-bromoethane, to give a new hydrocarbon, C ($C_{11}H_{16}$). Please provide structures for A, B, and C.

A.

B.

C.